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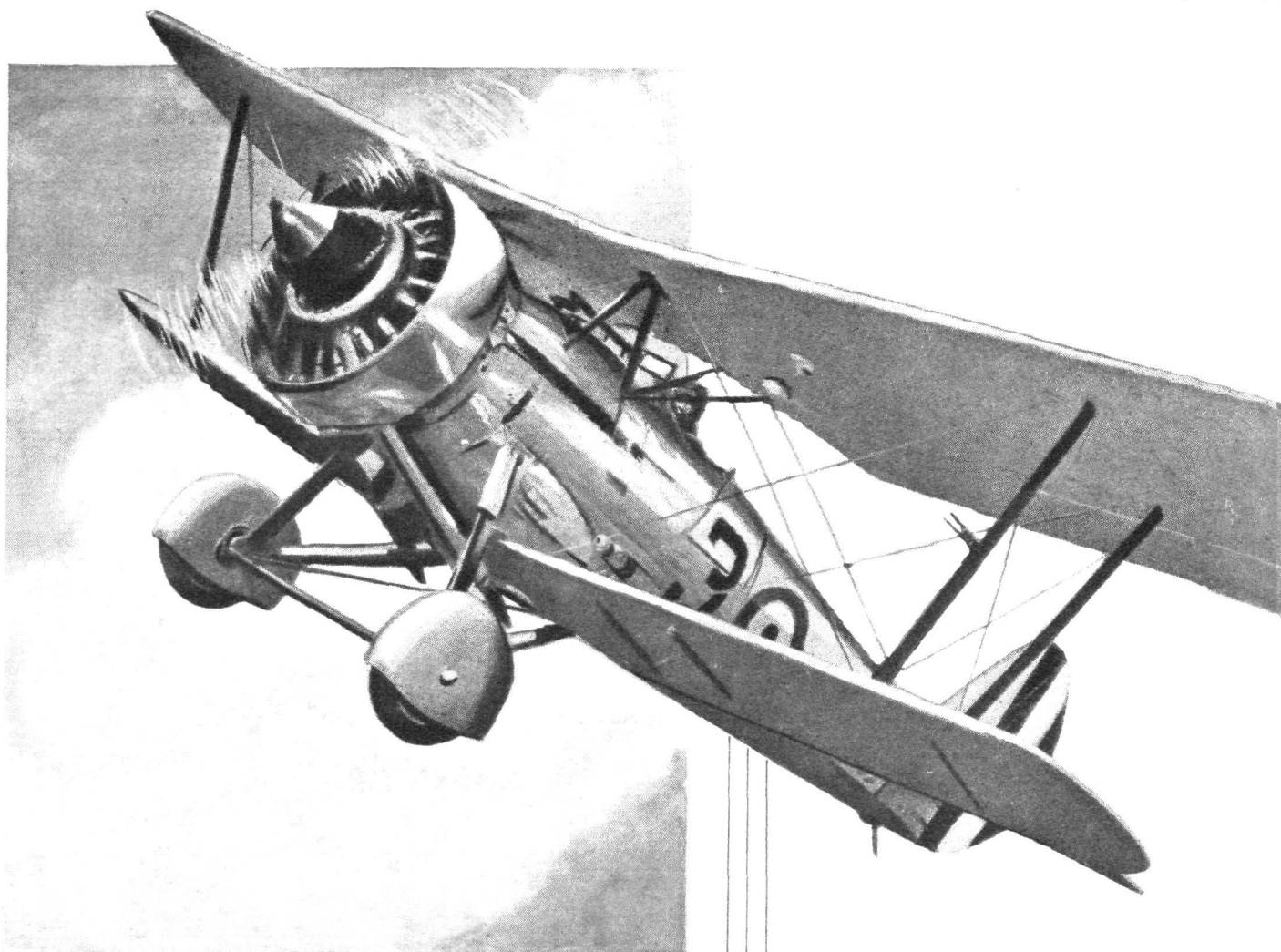
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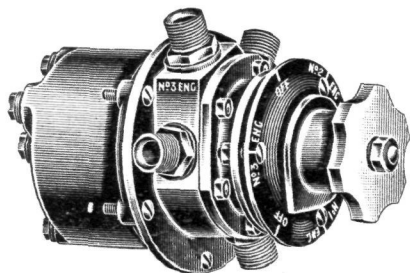
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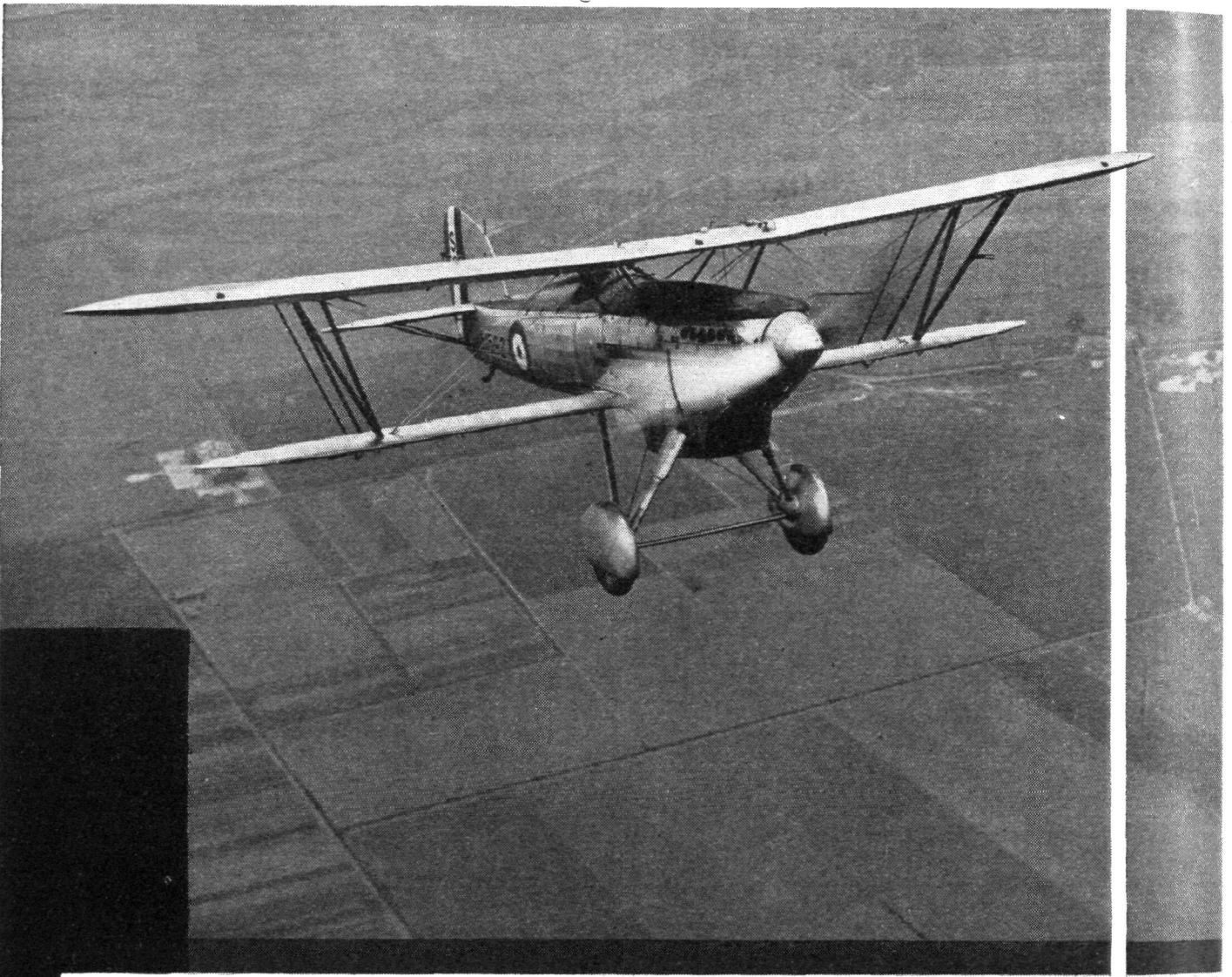
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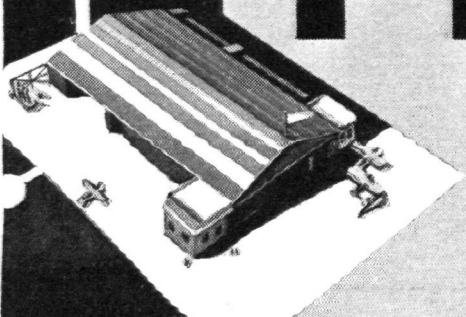
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First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 1283 (Vol. XXV. No. 30.) 25th Year.

JULY 27, 1933

Weekly, Price 6d.
Post Free, 7½d. Abroad, 8d.

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.

Telephone: (2 lines), Holborn 3211 and 1884.

Telegrams: Truditur, Westcent, London.

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EDITORIAL COMMENT



AS it, we wonder, a desire to appeal to the gallery which made Lord Londonderry mention the danger to life as one of the reasons why the R.A.F. is not to try to recover the high-speed record? Two main reasons were given in his reply to Lord Gorell in the House of Lords, expense and risk.

The Secretary of State would know that any talk of avoiding risk to life would gain him support from a certain section of the public, and so would strengthen his hand in sticking to a certain decision, which may have been arrived at for entirely different reasons.

In this case most people will probably take the view that expense is the only, or at least the governing, reason for the decision to allow Italy to keep unchallenged the high-speed record which was so finely won for them by Agello. We remember that the last Government refused to bear the expense of defending the Schneider Trophy, which would have gone to Italy by default if Lady Houston had not come to the rescue. The present decision bears a very strong family resemblance to that of the last Government, but in this case the talk of risk to the pilots has been adduced to support the case.

The general order to all Government Departments to avoid spending money on anything except social services is well known to be very stringent. This stringency is enough to account for any refusal to spend, even though it may mean refraining from a profitable investment. Lord Londonderry seemed to be at pains to show that other reasons had helped to affect his decision. He doubted whether further research work at the present moment would prove as valuable as the research work in 1926 and 1928 had proved. He asserted that our last two Schneider victories had actually been followed by a decline in our export trade in "this industry." In fact the Secretary of State tried to discount all the arguments which could be brought up by those who think that Great Britain ought to win back the high-speed record if she can. Knowing how deeply the economy argument must weigh with every head of a Department, the citizen may be pardoned if he thinks that the

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

1933.

July 28. Close of R.A.F. Lawn Tennis Championships, Hurlingham.

July 31-Aug. 1. Lawn Tennis: Inter-Services Championships, Wimbledon.

July 31-Aug. 4. Lawn Tennis: Airmen's Championships, Halton.

Aug. 7. Scarborough Ae.C. Flying Meeting.

Aug. 6-9. Leicestershire Ae.C. Aerial Tour.

Aug. 12. London-Newcastle Race.

Aug. 13-20. International Gliding Competition, Wasserkuppe, Germany.

Aug. 19-20. 5th Annual Canadian Air Pageant, St. Hubert Airport, Montreal.

Aug. 31.-Sept. 9. Model Engineer Exhibition, R.I. Horticultural Hall, Westminster.

Sept. 1-4. International Air Races and Gordon Bennett Balloon Race, Chicago.

Sept. 9. Kent Air Pageant, Maidstone Airport.

Sept. 9. Essex Aviation Display, Maylands Aerodrome, Romford.

Sept. 16. Bristol and Wessex Ae.C. Garden Party.

Dec. 18-24. International Rally at Cairo and Meeting of the F.A.I.

other arguments would not weigh very much by themselves.

We think that the Secretary of State was rather pessimistic in his estimate of cost. Lady Houston guaranteed £100,000 for the winning of the last Schneider and the establishment of Stainforth's record. Lord Londonderry says that to regain the record would cost at least £200,000. His Lordship may be right, but the figure seems very high when only a record, not a Schneider contest plus a record, is in question. A great part of the difficulties of design with the Schneider machines was the stowage of the fuel for the course and the water for the engine. These difficulties shrink to small dimensions when a machine is only wanted to make four or five runs over a course of $3\frac{1}{2}$ kilometres. It is true that our last record was the mere bagatelle of 407 m.p.h., while to beat Italy's we must design a machine which can at least make a speed of 428.76 m.p.h., for a speed record stands until it is beaten by five miles an hour. But as our 407 m.p.h. was flown by a Schneider machine and not by a special record machine, it might not tax our Mitchells and Rowledges too highly to produce a machine which could do that for considerably less than £200,000. We should not need so many as four machines, or a High Speed Flight of so many as five pilots. Still, if the plea simply is that Great Britain cannot afford the money, there is nothing for it but to accept the decision, however unpalatable it may be.

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Our own feeling is that the other arguments weakened rather than strengthened the case put forward by the Secretary of State, and in particular the argument about risk. Italy has certainly paid

a heavy price in lives for her success in high-speed work. We can recall straight away the names Motta, Dal Molin, Monte, and Neri. Our own loss in high-speed work consists of Kinkead and Brinton. The Secretary of State mentioned that four Air Force pilots had lost their lives "in practice for the Schneider Trophy or in attempts on world's records." We have mentioned two of them. The other two can only be Jones-Williams and Jenkins, who were killed in an attempt on a world's record, *i.e.*, the long-range record, but not on high-speed work. If those were the two to whom the Secretary of State referred, the allusion did nothing to strengthen his argument about the risks of high-speed work, and it was rather like dragging a red herring across the trail. It was a pity to confuse the issue in that way.

Everyone knows that if pilots were invited to volunteer for a new high-speed flight, hundreds of names would be sent in. We admit that the Secretary of State must not risk the lives of willing volunteers without good cause, and that he and his advisers at the Air Ministry are the only judges of what constitutes a good cause. But high-speed flying must inevitably go on. The speed of our landplanes is ever being increased, and lately we have produced a special "Fury" said to be capable of 250 m.p.h. It is not many years since that was greater than the speed of a Schneider winner, and in those recent years there were folks who shook their heads and said it was all very dangerous, and what was the good of it anyway? A few years hence 428 m.p.h. may be thought a very normal speed for aeroplanes.

The world simply will not stand still in these matters, and Great Britain must not be left behind while others lead. In many ways fast landplanes are more dangerous than fast seaplanes. The only serious difficulty with the seaplanes is in taking off, and it was during an attempt to take off that Brinton lost his life. In the air the seaplanes were easy to fly, according to Wing Com. Orlebar. There were no mishaps of any consequence during landings. Landing a very fast landplane is at least as risky a business. Nevertheless, high-speed work will go on, whether it be on seaplanes or on landplanes. It seems to us a pity that the work should not have the world's record before it as an incentive.

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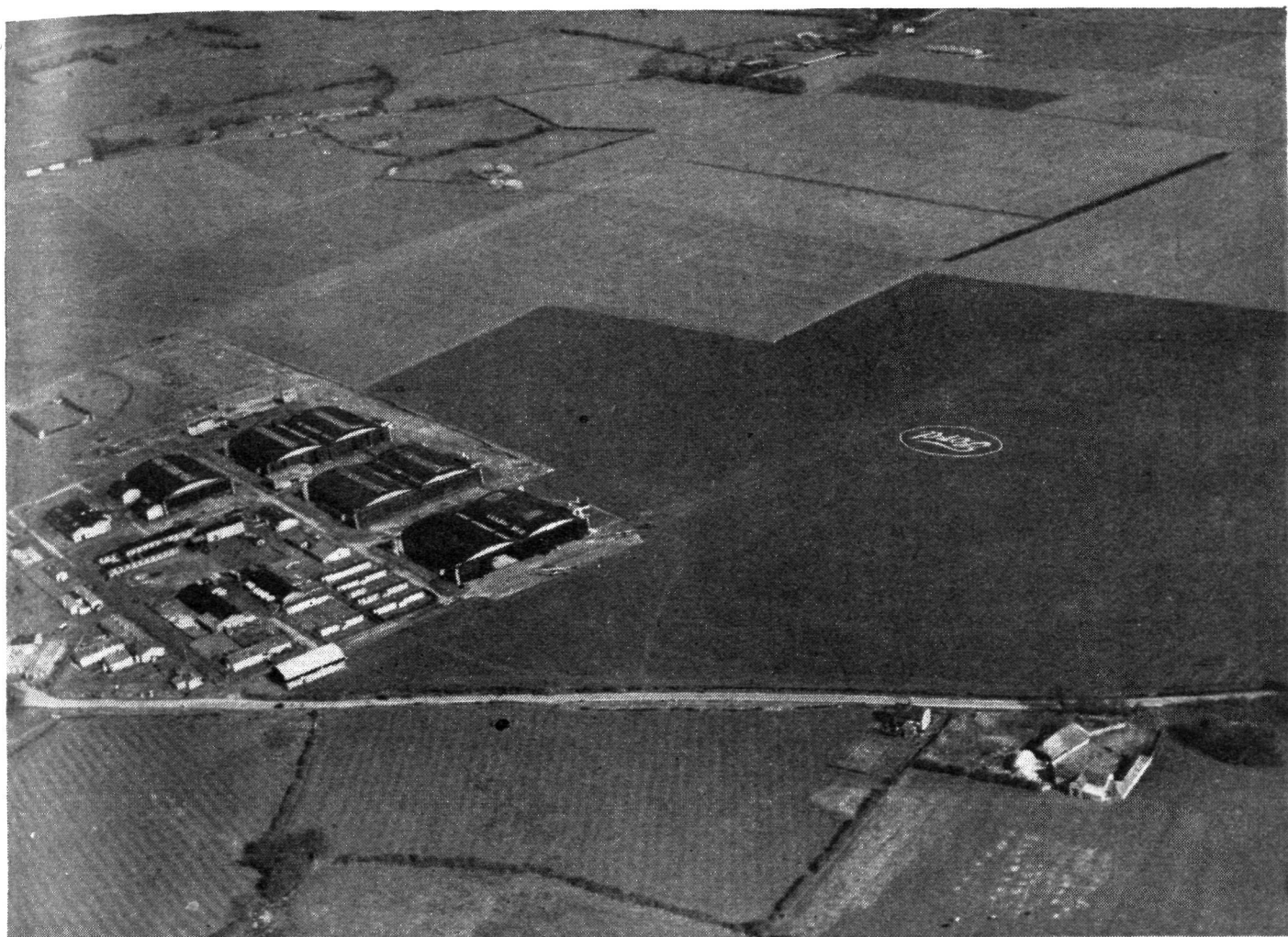
The sympathies of everyone will go out to Mr. and Mrs. Mollison on their hard luck. The great danger of crossing the Atlantic in a landplane was past. They were flying over the land, to all intents

and purposes just finishing a special, but not an abnormal, long flight. They realised their shortage of petrol and decided to land. Then, perhaps, the strain of the long hours on physical endurance and of the risks encountered began to tell, and in landing unceremoniously the "Dragon" turned over. It and both its occupants suffered damage. Everyone is very glad that neither of the pilots was seriously injured.

When the Mollisons first published their plans, we expressed the opinion that a long-distance record, such as one from New York to Baghdad, would be a flight very well worth while. The best policy would be to transport the machine to the starting point in the safest way, which in this case would not be by air. To ruin the chances of a flight which would have been really worth while by a more or less ordinary crossing of the Atlantic was a risk not worth the taking. Our fears, though not our worst fears, have been verified. The really important flight must now be postponed for a long time, which is unfortunate.

What the Mollisons did achieve, however, was very well done. Their navigation was good. Each of them on previous solo flights has done well in navigation, and when together both kept up their reputations. The "Dragon" and the two "Gipsy Majors" also did bravely. The fuel economy seems to have been very good. They are said to have had 400 gallons of fuel on board, and they were in the air for 39 hours, which gives a consumption of five gallons per hour per engine, as against the $6\frac{1}{2}$ g.p.h. which a "Gipsy Major" usually consumes. The de Havilland firm deserve hearty congratulations.

At the same time, Mr. Wiley Post finished his flight round the world in about $7\frac{1}{2}$ days. Evidently these feats of wonderful endurance must amuse Mr. Post. They also do great credit to modern engines and machines. They may point the way to very rapid travel in the future, when air routes are organised in different parts of the world. We cannot believe that many people will for some little time want to fly across either the North Atlantic or the North Pacific, but certainly very long air journeys will be possible in the future where the traffic justifies them. The names of the pioneers will then be remembered with honour.



FORD AIRPORT FROM THE AIR : Ford Aerodrome, as can be seen from the layout of the hangars, is a war-time one, which is now being used by the Rollason Aviation Co. (who run the South Downs Aero Club) for school work and also for the extensive repair shops of the company. The lower view is a close-up showing the club-house with its attractive sunny lounge and well-kept garden. (FLIGHT Photos.)

THE MOLLISONS' FLIGHT

IT was in the early hours of Saturday morning, July 22, that Mr. and Mrs. Mollison decided the weather reports from the Air Ministry were favourable enough to allow a start to be made on their Atlantic flight. At 7.45 a.m. their D.H. Dragon "Seafarer," two "Gipsy Majors," left Stag Lane for Wales. On arriving at Pendine Sands, Carmarthenshire, the machine was loaded up with 420 gall. of petrol. At noon of the same day Mr. Mollison took off from the sands after a run of nearly 1,000 yd.

According to the Mollisons' own story, they started off by flying just off the surface of the water, the visibility not being good. Strong head winds, fog and thick clouds handicapped them during most of the ocean crossing, so much so that they only saw the sea for about 3 hours out of the 22 they spent over it. At about 9 a.m. the following morning, Sunday, July 23, the Mollisons noted that the sea was sprinkled with icebergs, so they presumed that land was not far off. Actually it was first sighted by them about midday. Reports from places on their route state that the machine was sighted over Robinson, Newfoundland, at 5 p.m. on Sunday, July 23; over New Glasgow, Nova Scotia, at 6.45 p.m.; over Advocate Harbour, Nova Scotia, at 8.45 p.m.; over Bar Harbour, Maine, at 10.32 p.m.; over Cape Elizabeth, Portland, Maine, at 10.42 p.m., and over Provincetown, Mass., at 11.35 p.m.

Towards the close of Monday, July 24, when it was getting dark, the "Seafarer" was approaching New York.

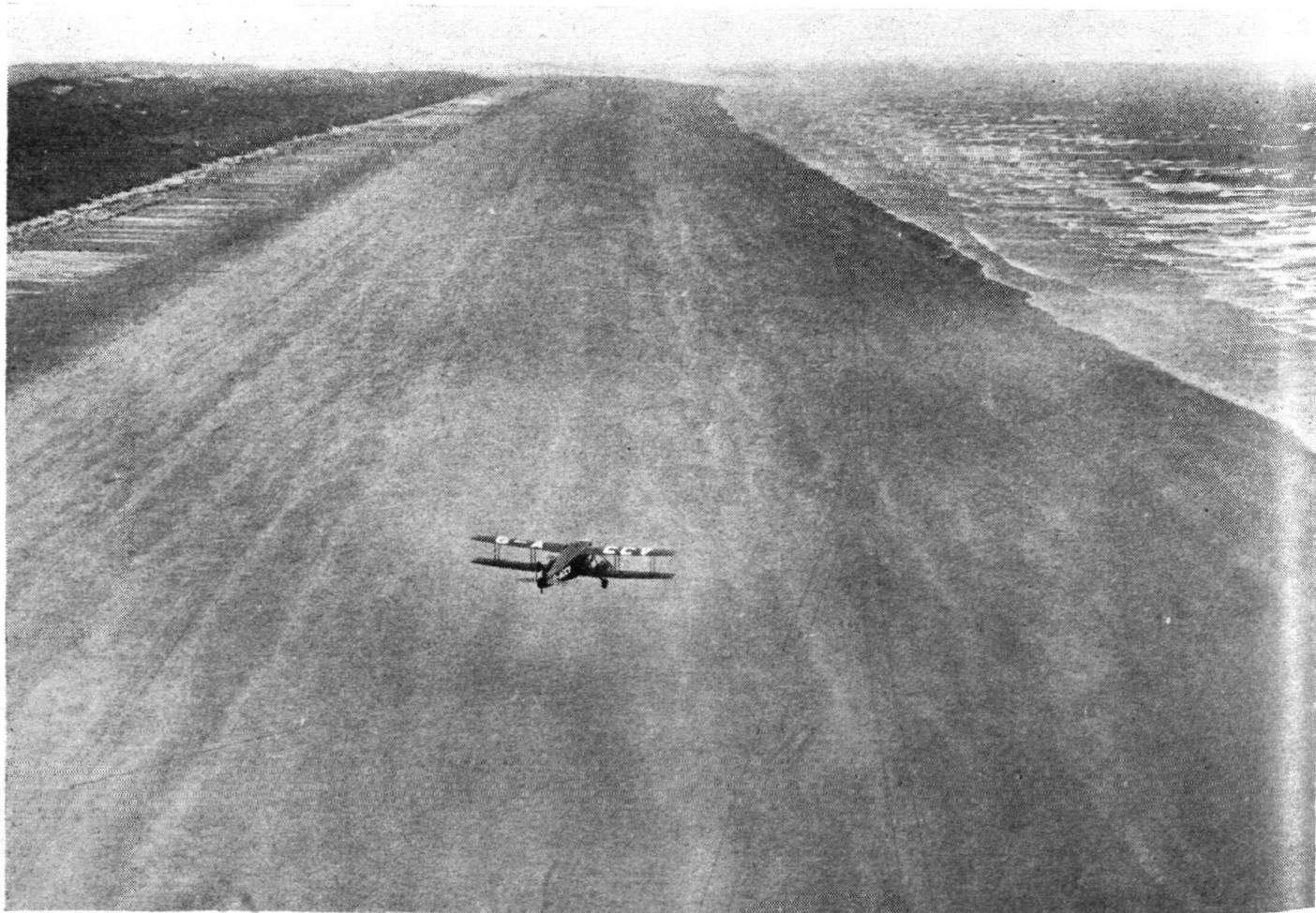


(FLIGHT Photo.)

The Mollisons, knowing that their petrol supply was running perilously low, gave up the idea of attempting to reach New York and decided to land at Bridgeport, 60 miles short of their destination. The aerodrome was lit up, a light trained on the wind indicator, and a machine was sent up to guide them down. Mr. Mollison, however, landed down wind, outside the aerodrome, and in a swamp. The machine turned over, Mr. Mollison being flung through the windscreen, while Mrs. Mollison crawled out from the wreckage. Both had to be taken to hospital, Mr. Mollison with face cuts, and Mrs. Mollison with shock. After a few hours in hospital Mr. and Mrs. Mollison were flown to New York, where they received a great welcome. It is reported that Mrs. Mollison was highly indignant at the suggestion that the crash was due to over-fatigue, rather was she prepared to blame the airport authorities. It is a trifle early at present to endeavour, from the many varied reports, to lay blame, but Mr. Mollison, in his own story, states that there was considerable ground fog over the landing ground, which seems a more likely

explanation for a landing being made outside the aerodrome.

In 39 hours the Mollisons have succeeded in flying the 3,300-mile crossing of the Atlantic which represents an average speed of about 85 m.p.h. In the issue of June 8, FLIGHT expressed an opinion that there was little wisdom in attempting the east to west crossing, when the setting up of a new long-distance record was the primary object.

THE START : *Seafarer* just after taking off from Pendine Sands.



As usual, Mr. and Mrs. Mollison used

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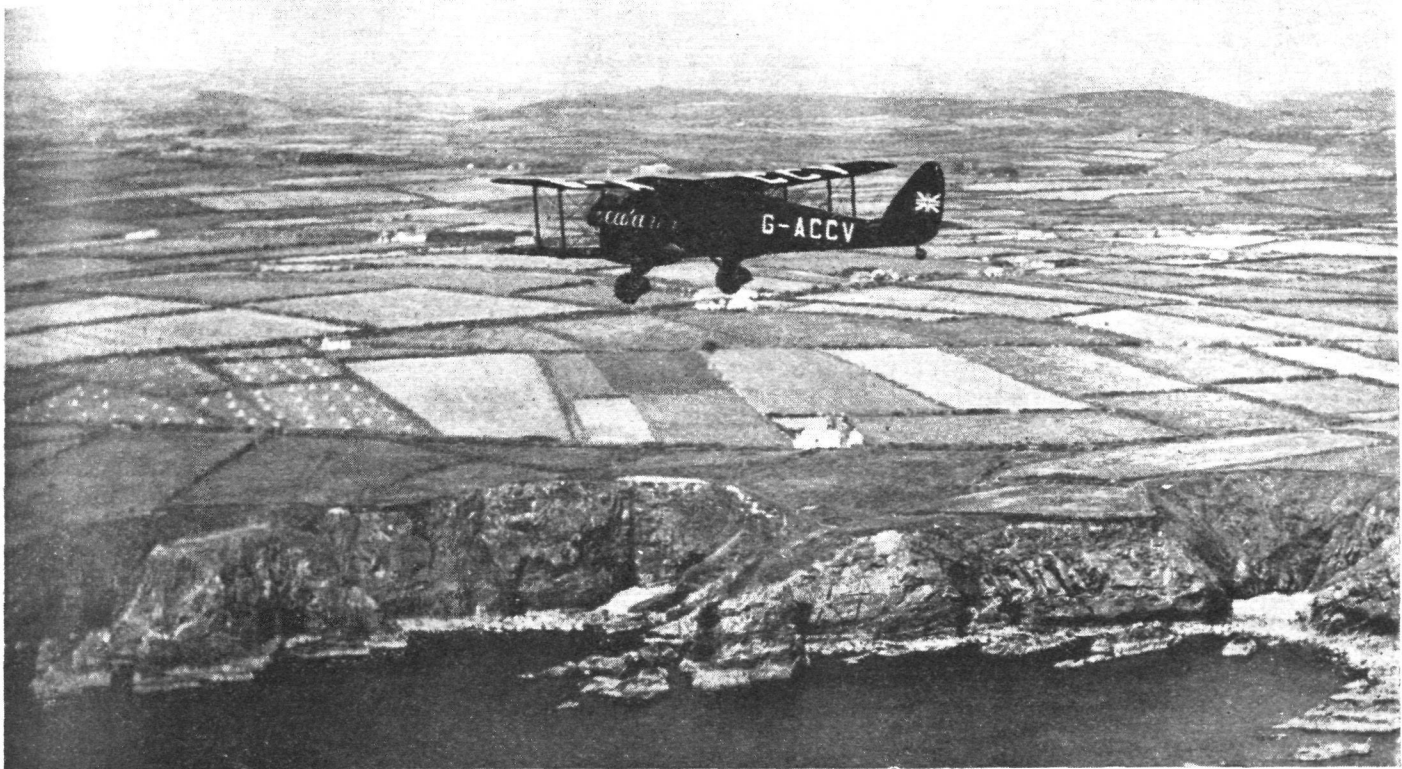
MR. & MRS. MOLLISON
took no chances on their oil

THEY CHOSE

WAKEFIELD

Castrol
XXL

for their D.H. DRAGON MOTH



"GOING WESTWARDS": The two "Gipsy Major" engines of the *Seafarer* must have disturbed the peasants of this part of Ireland, as Mr. and Mrs. Mollison flew at low altitude on their way to the Atlantic Ocean.

Whether the Mollisons will still be able to attempt their long-distance flight is at present uncertain, for the *Seafarer* is damaged beyond repair, the engines, instruments, and other salvaged parts being shipped home to England. Mr. and Mrs. Mollison must consider themselves very lucky to have escaped so lightly from such a crash. It seems unfortunate that noon on Saturday was chosen for the start of the flight. Had the take off been delayed until the evening the last few hundred miles of the flight would have been during the hours of daylight, in which case the *Seafarer* would, presumably, have been landed safely. The two "Gipsy Major" engines ran splendidly for the duration of the whole flight, often at 2,150 revs. for long periods, which makes the crash seem all the more pitiful.

About the only thing the flight has proved, apart from the splendid reliability of the engines, which everybody already recognised, is that the physical strain of a long flight is terrific. At the end of Mr. Mollison's record flight from Australia in 1931, he landed on the beach near Pevensey, and was lucky not to damage his machine. In March of last year he finished his record flight to the Cape by running into the sea, and now this crash; fatigue

appears to be largely responsible.

Lord Londonderry, Secretary of State for Air, has sent the following telegram to Mr. Mollison: "Much regret to hear of unfortunate accident to yourself and Mrs. Mollison and of damage to machine, when you had already accomplished so much."

The flight is yet another excellent demonstration of the quality of British aviation material. The De Havilland "Dragon" and "Gipsy Major" engines gave no trouble of any kind, and, in point of fact, the engines seem to have been amazingly economical, each having apparently consumed but 5 gallons of "Shell" per hour and a very minute quantity of Castrol oil. The K.L.G. plugs of the "Gipsy Major" engines were fired by B.T.H. magnetos, and the very economical fuel mixture was attained with Claudel Hobson carburettors. Smooth running was ensured by fitting Hoffmann bearings. Navigation was helped by fitting Smith's instruments and Huson compasses, and surety and delicacy of control was ensured by Simmonds-Corsey controls. The black finish of *Seafarer* was due to Titanine Dope. The Dunlop wheels stood up well to the take-off with full load.



At Buckingham Palace

At the Investitures held on July 11 and 12 by H.M. the King at Buckingham Palace, the following were amongst those introduced into the presence of the King and invested with the Insignia of the respective Divisions of the Orders into which they have been admitted:—

Order of the Bath (Military Division)

Received the Honour of Knighthood, Knight Commander:—

Air Marshal Hugh Dowding, C.B., C.M.G., R.A.F.

Companions:—

Air Commodore MacNeece Foster, C.B.E., D.S.O., D.F.C., R.A.F.

Air Commodore Cuthbert Maclean, D.S.O., M.C., R.A.F.

Order of the British Empire (Military Division)

Officers:—

Wing Commander Arthur Belfield, R.A.F.

Wing Commander Coningsby Colbran, R.A.F.

Sqd. Ldr. Thomas Drowley, R.A.F.

Members:—

F/O. Francis Donovan, R.A.F.

W/O. Joseph Beresford, R.A.F.

W/O. Daniel Newton, R.A.F.

(Civil Division)

Officers:—

Mrs. Florence Wilson.

Mr. Archibald Gilpin, Air Ministry.

Member:—

Mr. Henry Horne, No. 3 Stores Depot, R.A.F.

His Majesty then conferred Decorations as follows:—

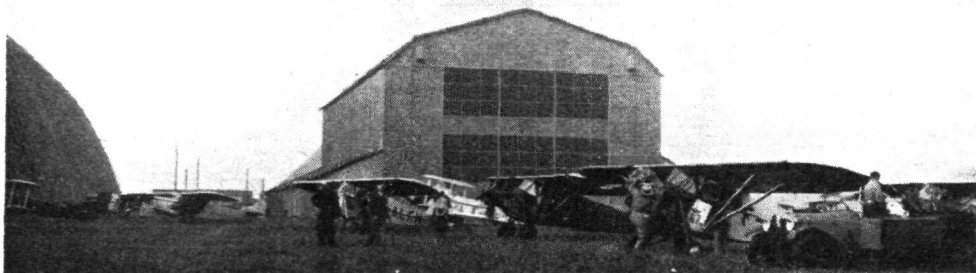
Bar to the Air Force Cross

Sqd. Ldr. Edwin Goodwin, R.A.F., and Flt. Lt. Gilbert Nichollets, R.A.F.

The Air Force Cross

Wing Com. Albert Daly, R.A.F.; Sqd. Ldr. Oswald Gayford, R.A.F.; Sqd. Ldr. Edward Openshaw, R.A.F.; Flt. Lt. Geoffrey Saye, R.A.F.

Amongst those also present were Air Chief Marshal Sir E. Ellington (Principal Air Aide-de-Camp) and Group Capt. F. L. Robinson (Aide-de-Camp in Waiting).



Ready for the start of the Tour of France.

THE UNION OF "PILOTES CIVILS" TOUR OF FRANCE

FAVOURED by fine weather for the first time in three years, 57 tourist planes took off from the Orly Airport on Friday morning, July 21 last, in the Third Annual Tour (10 days) of France organised by the Union of the "Pilotes Civils." The machines were divided into three classes, rated according to their ground speed as shown in their official "homologation" trials before the Service Technique. The fastest machines were sent away first in order to expedite landings at the various airports. These groups were as follow:—

The Blue Group composed of planes having a speed superior to 170 km. (106 m.p.h.). This group consisted principally of the Farman types 230 and 350 series composed of two-seater, low-wing, open-cockpit monoplanes, equipped with Renault "Bengali" (130 h.p.) and Salmson engines, together with some Caudron "Phalenes" and Potez, type 43, three-seater cabin monoplanes. The Farman 353 ("Gipsy Major" engine) of Miss Aleck Plunian and Maurice Finat, who finished second in the "Twelve Hours of Anger" a few days ago was also in this group.

The White Group composed of planes of a speed of 150-170 km.p.h. (90-106 m.p.h.). This group consisted about equally of Caudron type 270 two-seater open-cockpit biplanes equipped with Salmson 95-h.p. radial air-cooled engines and Potez 43 cabin monoplanes equipped with Potez 100-h.p. radial air-cooled engines.

The Red Group comprising planes of a speed inferior to 150 km.p.h. (94 m.p.h.). Potez, type 36, three-seater cabin monoplanes comprised the largest part of this group, together with some Caudron "Phalenes" and 270's, equipped with Renault, Salmson and Potez 95-100 h.p. engines.

Miss Maryse Hilz, the well-known long-distance aviatrix, also accompanied the Tour, piloting the Farman 190 (300-h.p. Gnome & Rhone K7). She had as a passenger Mrs. Louise Faure Favier, the aeronautical lecturer and writer who is giving daily radio talks on the aerial aspects of France. The official planes comprise the Hanriot 437, Lorraine 230-h.p. engine, of Marcel Haeglen, the Commissioner-General, and the Farman 204 of Pradel de Lamaze, the General Secretary of the Tour. The Alexander Jazz Band, in their Farman 190, is also with the tourists to give concerts at each landing, and Louis Gaubert, the veteran, in his venerable war-time Farman *cage a poule* (chicken cage) is also accompanying them.

At 8 o'clock Friday morning Marcel Haeglen, the Commissioner-General, having received favourable "meteo" reports, decided to start the Tour, and at 8.14 o'clock de Lamaze gave the signal to Roger Nouvel in his Farman 231, Renault 95-h.p. engine, who was the first of the Blue

Group, to "take off." The others followed in quick succession until at 9.10 o'clock all the planes had been sent away in perfect order, with one exception. Jean Meunier, piloting a Farman 352, in taxiing to the starting position, encountered a large rut covered with grass and twisted his landing gear, thus putting his machine out of service temporarily. Repairs were quickly made, however, so that he could join the Tour the next day.



Marcel Haeglen, Commissioner-General, and his Hanriot 437 in which he will follow the Tour.

M. Pierre Cot, the Air Minister, piloting a Morane type 230 machine, arrived shortly before the start and, after conversing with the pilots, "took off" again and accompanied the Tour for some distance before returning to Villacoublay. Two other Morane planes of the same type, piloted by his aides, acted as an escort to the Air Minister.

The Tour, which comprises some 3,700 km. (2,100 miles) in length, is divided into eight sections of several easy stages each, together with two days of rest. It is intended to be a test of regularity of flying, and a demonstration to show the public the possibilities of tourist aviation. The course as laid out comprises a tour all around France, with a short flight at the end into Belgium. The itinerary is as follows:—

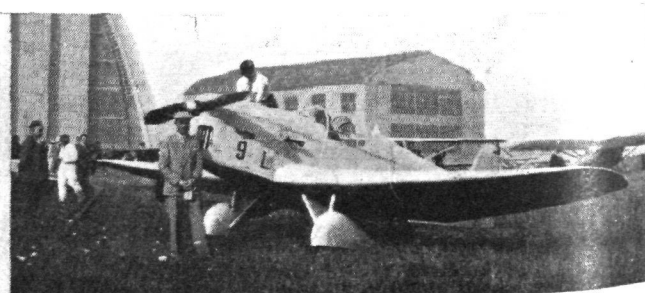
First Day, Friday, July 21.—Orly, Rheims, Nancy, Luxeuil Belfort, Dijon. 595 km.

Second Day, Saturday, July 22.—Dijon, Saint Etienne, Montelimar, Avignon, Cannes. 580 km.

Third Day, Sunday, July 23.—Rest at Cannes. *Fourth Day, Monday, July 24.*—Cannes, Marseilles, Nimes, Montpellier, Perpignan. 455 km.

Fifth Day, Tuesday, July 25.—Perpignan, Carcassonne, Toulouse, Pau, Biarritz. 465 km.

Sixth Day, Wednesday, July 26.—Rest at Biarritz.



TWO COMPETITORS: On the left a Potez 37 (95-h.p. Renault) and, right, the Farman 353 ("Gipsy Major") of Maurice Finat and Miss Aleck Plunian.

Seventh Day, Thursday, July 27.—Biarritz, Bordeaux, Angoulême, Niort, Nantes, la Baule. 572 km.

Eighth Day, Friday, July 28.—La Baule, Rennes, Dinan, Deauville. 335 km.

Ninth Day, Saturday, July 29.—Deauville, Berck, Knocke-Zoute, Brussels. 420 km.

Tenth Day, Sunday, July 30.—Brussels, Valenciennes, Buc Aeroport (Versailles).

The Tour will terminate at the Blériot Aerodrome at Buc, near Versailles, on Sunday, July 30, the planes being expected to arrive at about 3 p.m. Numerous fuelling stations along the route have been provided and the participants are required to obtain visas of their log books at many of the above-mentioned places.

A sum of 200,000 francs will be distributed in prizes for regularity. The speed of the participant, as obtained in his Service Technique homologation tests will be divided by the speed that he makes in each section of the Tour, with an allowance of 6 km. to take into account the altitude above ground level at which he is obliged to fly. Each participant will thus receive a number of points for each section of the Tour. These will be totalled and divided into the sum of 200,000 francs, which will be divided *pro rata* among the participants.

An additional sum of 100,000 francs will also be divided *pro rata* among the participants according to the number of passengers that they carried in the Tour.

R. C. W.

PETROL FROM COAL

By E. NUGENT HEAD

The Prime Minister announced in the House of Commons on July 17 that the Government had decided to introduce a Bill which will give a guaranteed preference in respect of light hydrocarbon oils manufactured in this country from indigenous coal, shale or peat.

THE story of the development of petrol from British coal by the Low-Temperature process, or rather that of the carbonisation of coal, dates back several hundred years, for as early as 1681 there is record of a patent in the names of Becker and Searle, for the production of smokeless fuel, tar and pitch from coal. Many were the experimenters in this field who followed, but it was not until 1906 that a practical commercial process was developed.

The inventor of the process which produces the petrol now being supplied to the Air Ministry was Thomas Parker, of Wolverhampton, who, as a result of many years of research, took out a master patent for the manufacture of "Coalite" smokeless fuel, and so founded the low-temperature carbonisation industry of to-day. Go to the low-temperature carbonisation works at Askern or Barugh, and you will see that his years of toil and disappointment have borne good and healthy fruit.

The problem Parker had to face in the production of a smokeless fuel—and it was in the production of such a fuel that he was solely interested—was one that had puzzled many of his predecessors. The common method of carbonising coal for the production of gas was to roast the coal in iron retorts at as high a temperature as possible, until all the volatile matter in the coal had been driven off as a gas, leaving a residue of hard coke which would only burn in specially designed furnaces.

Parker's ambition was to extract from the coal just sufficient of the volatile elements to eliminate smoke, and to leave in the retort a partially carbonised fuel of uniform composition and high calorific value, which could readily be lighted in an open-fire grate, and whose combustion would yield a high temperature.

The obvious way to produce such a fuel would have appeared to be by roasting the coal in the ordinary way until just the desired amount of volatile matter had been distilled off, but it was found that in practice this method

was not satisfactory. The temperature in the centre of the retort was lower than that at its edge, which consequently carbonised the outer part of the charge more than that in the centre. This destroyed the homogeneity of the residue and nullified its value as a marketable fuel.

Years of research solved this problem for Parker, and he found that it was possible to produce the fuel he desired by using batteries of small-diameter retorts in which the coal was roasted in the presence of steam at a temperature of 650 deg. C. This is the process that is in use at Askern and Barugh to-day.

One of the great economies of the low-temperature carbonisation process is that small coal can be used. This commands a lower price than the large coals that are used for domestic consumption and operating expenses are thus reduced.

Here is a typical yield per ton of coal carbonised:—

	Cwt.	Per cent. yield
Coal oil	1.60	8.00
Liquor	2.21	11.05
Gas	1.32	6.60
Smokeless fuel ...	14.58	72.90
Loss, etc.	0.29	1.45

Each ton carbonised can be reckoned to yield about 2½ gallons of high-grade petrol and 18 gallons of heavier gravity oil. It is possible, however, by hydrogenation, to convert all of this heavier oil into petrol of great volatility with a very high anti-knock value, thus giving a total petrol yield of slightly more than 20 gallons per ton of coal carbonised.

The annual petrol consumption of the Royal Air Force is about 6,000,000 gallons per annum, which means that Britain's air arm could be made self-sufficient as regards fuel by the carbonisation of 300,000 tons of coal a year, which figure has already been passed, and quite a small amount compared with the 40,000,000 tons that are burned domestically in this country annually! If only 50 per cent. of these millions of tons were carbonised annually and the resultant oil hydrogenated, our petrol import would drop by 400,000,000 gallons, and many thousands of men at present unemployed would find work.

Those Missing Wheels

A MAN—who, though obviously keen on aviation, cannot be a reader of FLIGHT—was looking out of his window facing that nice straight stretch of railway line which runs between Redhill and Ashford. Along came a low-wing monoplane flying fast in the direction of Croydon; our prospective reader gave a gasp and then dashed to the telephone. "Hullo, is that Croydon Aerodrome? There's an aeroplane coming your way which has lost its wheels." Croydon bustled; out came the fire engine and ambulance; all was ready for the inevitable crash; willing ground staff standing by and the Control Officer watchful, almost excited probably, because commercial aviation is really getting very hum-drum nowadays. The look-out reports an aircraft approaching; there she comes. All ready? Right, stand by. . . . A few seconds later the new "Monospar" lowered its undercarriage into sight, landed, and manœuvring easily with its two "Pobjoy" engines, taxied into the General Aircraft Works!

(This is a true story, but we are unable to learn what the Control Officer said afterwards.)

F. R. Walker's Progress

We are glad to learn that Mr. F. R. Walker, who met with disaster in the King's Cup Race, is now in a somewhat more satisfactory condition. His internal injuries have necessitated the removal of a kidney, which has stopped the hæmorrhage and improved matters generally. Those who have seen the wreckage of his "Swift" ("Gipsy III") say that he is extremely lucky to get out alive. His engine stopped, due to his forgetting to pump up his fuel, and when he realised that he had to make a forced landing he sideslipped steeply to lose forward speed but took a wing off in a tree in so doing. Luckily for him the fuselage opened in the region of the cockpit when it struck the ground, and thus saved his life. We hope that his injuries will have no lasting effect and that we shall have him with us again all straightened out, with a nice new "C. of A." and fit to fly before very long.

WILEY POST FLIES ROUND THE WORLD

OUR narrative last week left Mr. Wiley Post flying from Moscow towards Novosibirsk on the night of Monday 17th-Tuesday 18th. He reached the latter place at 4.19 a.m. on the Tuesday, and, after waiting a little over 2 hr., he flew on again for Irkutsk. Bad weather cut short his next stage. He meant to make Khabarovsk, but was compelled to land at Rukhlovo at 7.30 p.m. (local time). This place is on the Chinese-Manchurian frontier. In landing he scraped low over some tree tops, and the fuselage of his machine was scratched by the branches. He pushed on, however, after a short rest, and reached Khabarovsk. He left there on Thursday morning, 20th, and flew across the Behring Sea. He did not stop at Nome, as he had been expected to do, but pushed on to Flat in Alaska, and in landing his machine tipped up and damaged the undercarriage and propeller. He at once sent a message to Fairbanks for a relief aeroplane to be sent to him, and Joe Crosson, a well-known Alaskan pilot, flew from Fairbanks carrying a new propeller to him. Mr. Post resumed his flight on Friday 21st, landed at Fairbanks, and almost at once set off again for Edmonton in Canada. On Saturday 22nd he reached Floyd Bennett Aerodrome at Brooklyn at midnight, and received a great welcome. Gen. Balbo and several of the Italian Royal Air Force officers were among those who greeted him. Mr. Post, who is an American Indian from Texas, and has only one eye, accomplished his circuit of the world in 7 days 18 hr.



50 min. He has thus beaten the time set up by himself and Harold Gatty, the Australian, which was 8 days 15 hr. 51 min. In each flight the same machine was used, namely, a Lockheed "Vega" named *Winnie Mae*. The engine is a Pratt & Whitney 450-h.p. "Wasp." As previously reported, a Sperry Automatic Pilot was fitted, and assisted considerably in relieving the pilot of much of the exertion of such an arduous flight.



WINNIE MAE—WINNIE DID: Wiley Post's Lockheed "Vega" (Pratt & Whitney "Wasp") which for the second time has done a "left-hand circuit" of the Northern Hemisphere. His second trip was completed in 7 days 18 hr. 50 min., thus bettering his first by 21 hr. 1 min.



Air Aid for Police

A STORY with no little significance comes up from Hampshire. Poachers were reported to be working a field, and a representative of the law was warned to keep a look-out for them. While searching for the miscreants the minion of the law perceived a machine belonging to the Hampshire Light Aeroplane Club in a field. Being of a bright disposition, he decided to utilise it. Requesting the pilot to fly low over the surrounding country, he eagerly scanned the ground beneath. The poachers were spotted and, much to their surprise and probable indignation, noted one of the cockpits contained the well-known blue uniform. They fled. It is reported, however, that the

policeman recognised one of them, who was later captured. A smart piece of work for which it is hoped reward was forthcoming in the shape of a growth of stripes on a blue manly arm.

Missing Italian Seaplane

AN Italian seaplane of the Aero Espresso, which operates between Athens and the Island of Rhodes, left Phaleron for Rhodes at 3.30 p.m. on Tuesday, the 18th inst., with a crew of four and two passengers. On its non-arrival at Rhodes, Italian and Greek destroyers and seaplanes searched the sea round the Cyclades and the Saronic Gulf. It is feared that the missing machine has been forced down by a gale.

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THE CINQUE PORTS INTERNATIONAL AIR RALLY

BRITISH pilots always receive the best of hospitality when they visit aerodromes on the Continent. This we know from our own experience, and we hope that those sporting foreign pilots who fly over here feel that they, also, are treated as they treat us. Unfortunately, the number of them is far smaller than the number of their British visitors, and so there is always a debit balance against us, on this account. Last year we off-set this by organising a meeting which was appropriately called the "Week-End Aérien"; this year the Cinque Ports Flying Club helped to repay our debt by holding an International Air Rally at Lympne on Saturday and Sunday last, July 22 and 23.

It was perhaps unfortunate that the date clashed with several other meetings, as this prevented many of our pilots attending. Notwithstanding this, however, we noticed that both Mr. "Bill" Styran and Mr. A. Henshaw, the former in a "Leopard Moth" ("Gipsy III") and the latter in his Comper "Swift" ("Pobjoy"), were sporting enough to fly down and take part in the race at Lympne on Saturday afternoon after they had gained first and second places in the Heston-Cardiff Race. On Sunday morning more pilots came on from the Cardiff meeting, among whom we saw Col. L. Strange with the new Spartan "Clipper" ("Pobjoy"). As so many pilots were coming and going, it was impossible to count the attendance accurately, but certainly we saw over 50 aircraft, excluding those Service machines belonging to No. 25 (Fighter) Squadron, on the ground at one time during Saturday afternoon, which after all was a very reasonable welcome to the visitors. Naturally, not nearly as many pilots came over the Channel as we should like to have seen, but nevertheless those who did, were shown how glad we all were to see them. Three machines came from France, all of them Potez 43's with Potez engines. They are high-wing monoplanes with fixed wing-tip slots, so their top speed is rather low, but their landing speed is equally low. Their pilots were M. Ferand Tailleur, M. Michel Doré, and M. Charles Debray, and all brought passengers, making together quite a cheery little French party.

The visitors from Germany came in five Klemms. Three of these had Hirth H.M.60 four-cylinder inverted engines, and the others had Siemens S.H.13 five-cylinder radials. The pilots were Herren:—Georg Wentorf, Dr. Reinhold Krebs, Joseph Schiller, Fritz Koerfer, and Christian Gensgen, all of whom came from Cologne. Mr. Van Marken, who is almost as well known and liked at Brooklands as he is in his native country, came over in his "Tiger Moth" from Holland, and two pilots—though perhaps one ought not to call them foreigners—flew over from Ireland, one being Mr. Robin Cazalet in his new "Monospar" (two "Pobjoys") and the other Mr. Dease in a "Moth" ("Gipsy I").

The Cinque Ports Flying Club is one of the three clubs operated by Brooklands, and, despite the limitations put on them by virtue of the fact that Lympne is an Air Ministry Aerodrome, they put up a fine show, and, we feel, achieved their object of fostering international re-

lationships in aviation. We gather that they by no means received all the backing for which they had hoped from the Air Ministry, and the formation of the aerodrome with its attendant regulations, made it impossible for them adequately to screen the road which runs along the western boundary. The result was that many hundreds of unwanted people enjoyed the programme of flying without in any way helping the Club by augmenting its funds. This was more unfortunate than is usually the case when

hedge-guests form such a large proportion of the audience, as the Club was on this occasion dependent on its own resources to entertain its foreign guests. They therefore had to rely largely on what they made from the "gate." However, the attendance inside the aerodrome was good, and we hope that they were not too much out of pocket, particularly as they were, in a manner, returning hospitality for the whole of British aviation.

As a Display it was good; the programme on both days was not too long, and the race was interesting, because as usual the handicapping was in the capable hands of Messrs. Dancy and Rowarth—Mr. Rowarth officiating at Lympne, as Mr. Dancy was looking after the Heston-Cardiff Race—so we were not surprised to see a fine finish. It will be seen from the table of results that the first six machines to finish in the final did so within 36.2-5 sec.; no one can hope for anything much better than that.

The heats for the race were run off after the main programme on Saturday, and provided some interesting racing. The course had been laid out so that the competitors were in view for a large portion of the race. They left the aerodrome in roughly a E.N.E. direction and after turning a point on top of the hills to the north, they had to fly along the brow of the hill before turning again to a course which kept them down parallel to the western boundary of the aerodrome. The final turning point, which was away to the W.S.W., brought them back home again, flying between the enclosures to a finishing line which was arranged practically at right angles to both enclosures, thus giving the spectators the best view they could have. The race was over two laps of this course, allowing us to gain a good idea of how the various machines were pulling up or dropping back. As the final leg of the

course lay straight towards us on a line which led between the enclosures, the machines looked well bunched up when approaching the finish. The excitement was therefore maintained right up to the line. One of the best efforts was undoubtedly that of Mr. Chater, who has become well known locally for the amount of spare time he has put in at the Club building up an Avro 504 from spare parts. He has fitted an equally aged Bristol "Lucifer" engine, and the result of his labours not only got into the final of the race, but was also used by Mr. K. K. Brown, the Club's



VIVE LA FRANCE. This little French visitor, George Tailleur, evidently knew what to read during the display. (FLIGHT Photo.)



BONHOMIE: Visiting pilots of five nationalities fraternising at Lympne. (FLIGHT Photo.)

AUS DEUTSCHLAND: One of the five German machines landing at Lympe. Each machine brought two visitors. (FLIGHT Photo.)

instructor, for crazy flying on both days. Mr. Chater got well away in his heat, only being overtaken towards the end. In the final he was neck and neck with the "Leopard Moth," which crossed the line only a split second ahead of him. The winner was Wing Com. Probyn, whose "Hawk" started favourite for the King's Cup Race, but which met with such bad luck. On Sunday he got ahead well, and gained the reward his perseverance deserved. A word of commiseration is due to the French pilots. They very sportingly all took part in the race, but appeared to be a little hardly treated by the handicapper.

The programme on Saturday opened with an Arrival Competition, wherein a maroon was fired at a "sealed



FOR ARRIVING ON TIME: Mrs. Battye with the silver cigarette-box she received for winning the Arrival Competition. (FLIGHT Photo.)

time" which lay between noon and 12.30 p.m. This event was won by Mrs. Battye, who landed at 12.25 p.m., having flown from Reading in her "Moth" ("Gipsy I"). The time was 12.26 p.m., so she was only one minute out. Flt. Lt. Max Findlay landed only one minute after the time, but Mrs. Battye received the prize, a silver cigarette box, as Reading is somewhat farther than Hanworth, whence Findlay flew.

The actual opening ceremony was accomplished by the Mayor of Hythe (Councillor Capt. G. Few), who, over the microphone, told his listeners something of the progress in club flying for which Brooklands, with their combined organisation, have been responsible. He is a fine example

to other Mayors, as he expressed his keenness on flying and therefore led the Fly-Past with Capt. Duncan Davis in a Club "Moth"—we hope that others will copy his precept.

One good thing about the whole programme was its variety. The machines shown off were many and of different sizes; there was the Arrow "Active" ("Gipsy III") which Mr. Thorn, now in charge of the Sales Department at Brooklands, threw about as only he can do; a Miles "Hawk" ("Cirrus III") belonging to Germ Lubricants, Ltd., which Mr. Powis himself proved was able to fly both fast and very slowly, and also to have a climb considerably in excess of that usually found in light aircraft; a Comper "Swift" ("Gipsy Major") which Flt. Lt. N. Comper, its designer and constructor, put into the steepest of steep climbs, but which seemed even then content to go on climbing for ever; an Avro "Cadet" (seven-cylinder "Genet Major"), which in the capable hands of Flt. Lt. Stainforth seemed able to stand still in the air and to sink vertically, while remaining under complete control; a "Monospar" (two "Pobjoys") which the public were luckily able to see while Flt. Lt. Clarkson was testing his engines preparatory to leaving; and also several other events which were not merely de-



A HELPFUL LEAD: The Mayor of Hythe (Capt. Few) leading the fly-past in one of the Club "Moths" piloted by Capt. D. Davis. (FLIGHT Photo.)

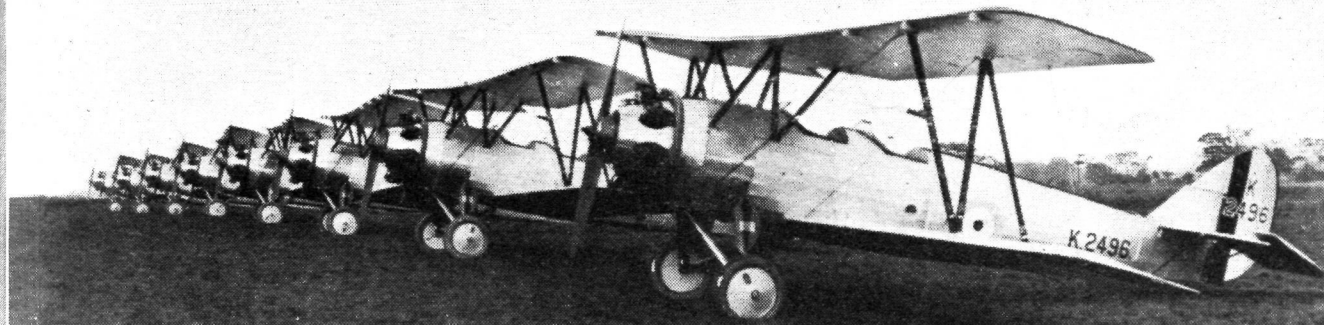
monstrations. For example, Flt. Lt. W. E. P. Johnson gave a very pretty display of inverted flying on a "Tiger Moth" ("Gipsy Major"), and also a combined aerobatic display, together with Mr. N. Tangye, both on Comper "Swifts" ("Pobjoys"); then Mr. K. K. Brown, the Club's popular instructor, flew in the craziest manner possible in the Avro 504 (Bristol "Lucifer") belonging to Mr. Chater, and later, together with Messrs. Waller and Cliff, all on Club "Moths," bombed a poor inoffensive car, scoring several direct hits with their flour bags.

Last, but perhaps the most impressive, part of the whole programme, was the display by



THE WINNER: Wing Com. H. M. Probyn won the Cinque Ports Wakefield Cup Race in this new Miles "Hawk" (Cirrus III) at Lympe on July 22. (FLIGHT Photo.)

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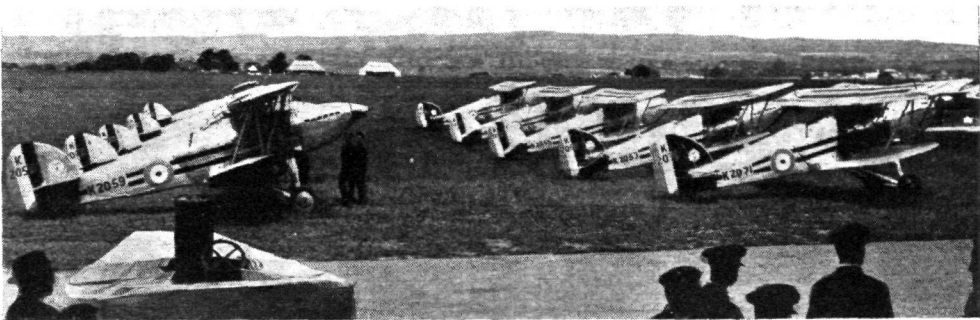
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R.A.F. : The Hawker "Furies" of No. 25 Squadron lined up ready for their display. (FLIGHT Photo.)



No. 25 (F.) Squadron from Hawkinge. Under the leadership of Sqd. Ldr. A. L. Paxton, their Commanding Officer, this squadron of nine Hawker "Furies" (R.R. "Kestrels") put up as fine a show of "tied-together" flying as anyone can hope to see. In our reports both of Hendon and of the opening of the Liverpool Airport we said that No. 25 Squadron were superb. It may sound as if we are running out of superlatives, as we can do no more than say that at Lympne they were even better—we hadn't thought it possible, but they certainly were. The *pièce de resistance* of their display is, of course, their roll by flights when flying with each flight in Vee formation and all three flights in line abreast, but hardly less impressive were

their loops and tight turns. After having seen their display, no one can fail to be amazed both at the skill of our R.A.F. pilots and also at the latitude which the Hawker-Rolls combination, in the "Fury," gives them, for it is really the speed range of this machine which has made air drill like this possible.

Sunday's programme was largely a repetition of the previous day's. No. 25 Squadron were, however, not there, but fortunately for the somewhat larger crowd of spectators than were there on Saturday, three "Harts" provisionally came over and evidently thought to help a bit, by flying round before leaving. Their formation was well kept and their turns accurate, but being, as they evidently were, on a flight from somewhere to somewhere, they did not stop to do aerobatics. Flt. Lts. Stainforth and Johnson put up a very pretty dog-fight, which they certainly enjoyed as much as their audience. Stainforth on the "Cadet" seemed at times to be able to turn inside Johnson on a "Tiger Moth," but the latter outclimbed the "Cadet" fairly often and would probably have lived to write out a combat report if both had been in earnest. On both days Mr. Fairlie made parachute drops with a G.Q. chute, landing well in the aerodrome on each occasion. The gentle manner in which it takes his weight when opening was very evident. At the conclusion of the meeting Maj. Waley presented the cups and cheques to the winners of the race.

CINQUE PORTS WAKEFIELD CUP RACE—FINAL					
Pilot	Aircraft and Engine	Handicap	Finishing at	Average Speed	Placing
		Min. sec.	Min. sec.	m.p.h.	
H. Chater ..	"Avro" (Lucifer) ..	9 14	28 16½	93	6
E. Wynn ..	"Avian" (Cirrus II) ..	9 14	28 12	93½	4
K. Waller ..	"Moth" (Gipsy I) ..	7 11	27 51	101½	2
L. Cliff ..	"Moth" (Gipsy I) ..	7 03	28 45	99	8
J. Watson ..	"Hawk" (Cirrus III) ..	4 43	29 12	106	9
H. Probyn ..	"Hawk" (Cirrus III) ..	4 16	27 40	115½	1
H. Leech ..	"Swift" (Pobjoy) ..	1 55	28 07	126	3
C. Napier ..	"Hendy" (Hermes IV) ..	0 18	29 39	126½	10
S. Thorn ..	"Active" (Gipsy III) ..	0 9	28 30	135½	7
A. Styran ..	"Leopard Moth" (Gipsy Major) ..	Scratch	28 16	138	5

MUSKEL-FLUG

EVER since man first began to dream of the possibilities of flying he has toyed with the idea of being able to raise himself into the air by his own muscular efforts. Some years ago a competition was organised in France, but nothing was produced at the time which could be regarded even as a small beginning towards anything useful. The aviation community generally has long since come to the conclusion that the thing is hopeless, and has been content to leave it at that. Now, however, the matter is being revived in Germany in all earnestness, and knowing how thoroughly the German designers, especially the younger school, have studied gliding and soaring, we shall not be in the least surprised if something useful is produced.

It may be agreed at once that man cannot develop enough power to lift himself into the air and remain there for prolonged periods. Alexander Lippisch, of Wasserkuppe fame, while agreeing that a man cannot develop more than one-tenth to one-fifth horse-power for any length of time, points out that racing cyclists must develop, for short periods, something in excess of one h.p. His argument is that one can assume a man possessed of just so much energy, which he can expend during a longer or shorter period. In other words, the product of work and time is constant. As a result of information furnished him by Dr. Brustmann, Herr Lippisch estimates a man's store of energy at 80,000 kilogram-meters (577,280 foot-pounds). On this basis he has plotted a hyperbolic curve of power developed by a man, from a few seconds' duration to 2 hr. For a period of one or two minutes, this curve indicates, a man should be able to develop 4-5 h.p.

Others have examined the problem and have come to somewhat similar results, and once it had been established that for short bursts a man could develop considerably more than the quarter or so h.p., it was decided to organise a competition. As might have been expected, Herr Oscar Ursinus, Founder and Editor of that excellent little German aviation journal *Flugsport*, was the moving spirit in the movement, just as he was the moving spirit of the

glider movement years ago. The competition is, however, being organised by the Polytechnic Company of Frankfurt a.M., which has offered a prize of 5,000 RM. The competition is open to German subjects only, and will be held on the Rebstock aerodrome, Frankfurt a.M. The competition will remain open from September 3, 1933, to September 2, 1934. There is no entrance fee.

The prize of 5,000 RM. will be awarded to the first man who covers without touching the ground a closed circuit around two turning points 500 m. apart (giving a total distance of 1 km., or 0.62 mile).

As it is realised that much of the power will have to be expended on the initial getting off, the organisers have decided to permit competitors to make use of means of storing up energy for the take-off. This may take the form of rubber cord, compressed air, or any similar means, but the original storing of energy must be done by the competitor himself, and by his own muscular power. He is given 30 minutes in which to store this energy in his machine, and the means used must be carried on the subsequent flight.

By way of a guide to intending competitors, Herr Ursinus publishes a sketch design for a possible type of machine. This is a pusher, in which the open tail booms are metal tubes inside which the rubber cord is housed. The front end of the upper tube goes to the airscrew, and the front end of the lower tube to the undercarriage. At the back, where upper and lower tubes meet, it is suggested that gear wheels should be incorporated, linking upper and lower "bunjie" together. The airscrew is provided with a brake, and the idea is that the pilot should wind up the rubber by pedalling, with the airscrew kept stationary. When the elastic is fully wound up, he will release the brake and "pedal for dear life." The energy stored in the rubber will aid him in the take-off, and continued pedalling will, it is hoped, keep him in the air for the requisite time, the rubber, of course, acting as a sort of dashpot. The scheme is intriguing, and should provide quite a lot of fun if it does nothing else.

Airisms from the Four Winds

Non-stop Flight from Milan to Moscow

MAJOR DE BERNARDI, a member of the Italian Schneider Trophy Team in 1927 and 1929, arrived in Moscow on Tuesday, the 18th, after flying non-stop from Milan. After a few days' rest he will do the return flight, also non-stop.

Nazi Planes over Austria

FOUR German aeroplanes, with wings clearly marked with swastikas, were seen flying over Austria. Nazi propaganda leaflets were dropped over the towns of Salzburg, Kufstein, Ried and Bischofshofen. Two Austrian police aeroplanes pursued the Germans, but were unable to overtake them.

The Lithuanian Crash

THE bodies of Capt. Darius and Lt. Girenas, the Lithuanian airmen, who crashed and were killed after flying the Atlantic, were conveyed in a German aeroplane to Kovno Aerodrome on Wednesday, the 19th. Nine Lithuanian aeroplanes escorted it from the frontier. The airmen were given a state funeral in Kovno on the following day.

The Lindberghs' Flight

COL. AND MRS. LINDBERGH, who are doing an aerial survey of the Greenland Trans-Atlantic route for Pan-American Airways, arrived at Godthaab, in South Greenland, on Saturday, July 22.

Mr. Woods' Flight

MR. JAMES WOODS, the Australian airman, who is flying from Australia to England, reached Calcutta and left for Allahabad.

A Royal Roumanian Tour

PRINCE NICOLAS OF ROUMANIA, continuing his tour of Europe, flew from Croydon to Paris, piloting his own S.E.T. machine.

Wireless Flight to New York

As foreshadowed in FLIGHT a short while back, Mr. John Grierson, who has been at Brough in Yorkshire for the past few months carrying out wireless tests, is shortly leaving England in an attempt to fly to New York by way of Greenland. He has installed in his "Moth" the Marconi-Robinson "Homing" device, which he intends to use to direct him across the Atlantic. This "Homing" device was described in FLIGHT for May 18 of this year. It consists of a loop aerial around the wings in addition

to a trailing aerial. The instrument has a three-way switch, which is normally kept in the central position. When the aeroplane is travelling towards the transmitting station, no signals are heard, but any deviation from the set course produces sounds in the receivers. The pilot can then, by turning the switch to right or left, determine his position relative to the set course. Mr. Grierson, on Tuesday, July 18, did a test flight from Brough to Kiel, a distance of 480 miles. He had hoped to be able to pick up and use the wireless broadcast from Warsaw, but this he was not able to do satisfactorily. Otherwise the test was quite successful. He hopes to set out from Scapa Flow at the end of the month in his "Gipsy I Moth," newly fitted with floats, which has been flown by him for 800 hr., in 26 different countries.

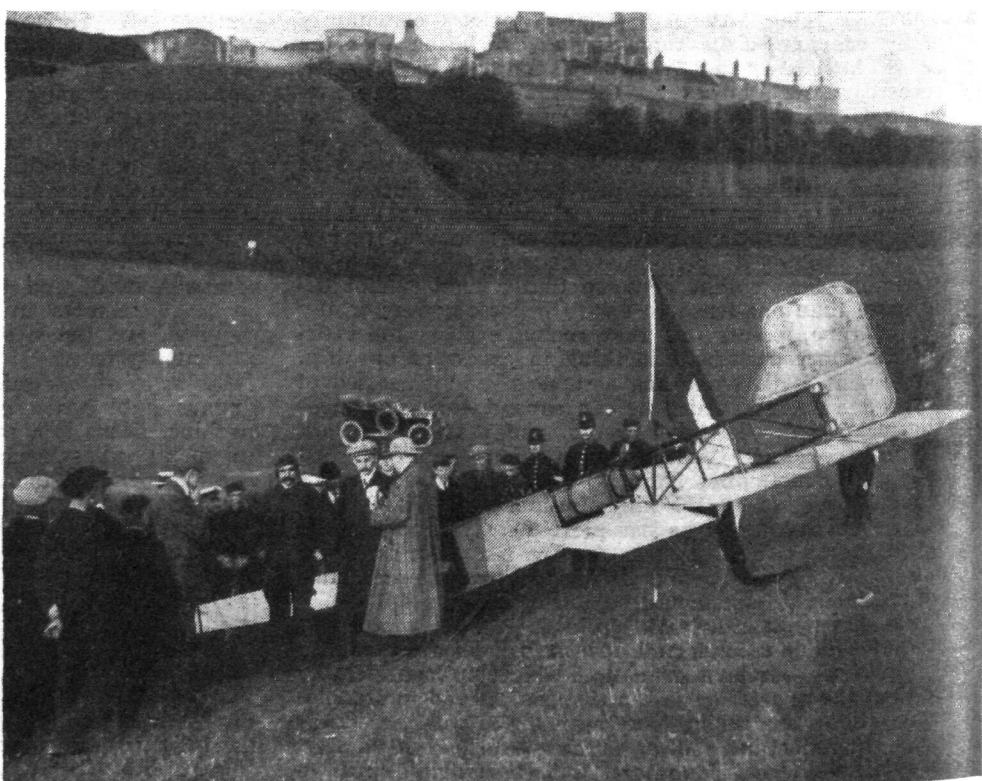
Record Flight by a "Breda"

A VERY fine flight was made by a "Breda 33" low-wing monoplane on March 5 of this year. The machine, piloted by Mr. S. Okura, with Mr. Suda as mechanic, took off from Chinchow, Manchuria, at 6.20 a.m. carrying news photos and news films, which had been taken by representatives of the *Osaka Daily News*. Keijo, in Korea, was reached at 9.35 a.m., and after re-fuelling the machine again took off and flew across the sea to Osaka, which was reached at 3 p.m. The photos carried were published the same evening. On March 7 the machine flew back to Chinchow by the same route. On March 13, at 6 a.m., the machine again left Chinchow and landed at Jehoi, after having flown by way of Chaoyang, through Chinese fire, at 8.10 a.m. Mr. Okura then collected reports and, taking off again at 10.30 a.m., arrived back at Chinchow at 12.30 p.m. Taking off once more at 12.50 p.m., the pilot landed at Korea at 5.10 p.m. Next morning the machine left at 6.20 in the morning and landed at Osaka at 11.16 a.m., war news being published in the afternoon of the same day. Pretty good going even for war time; some people seem to like flying.

Air Smugglers

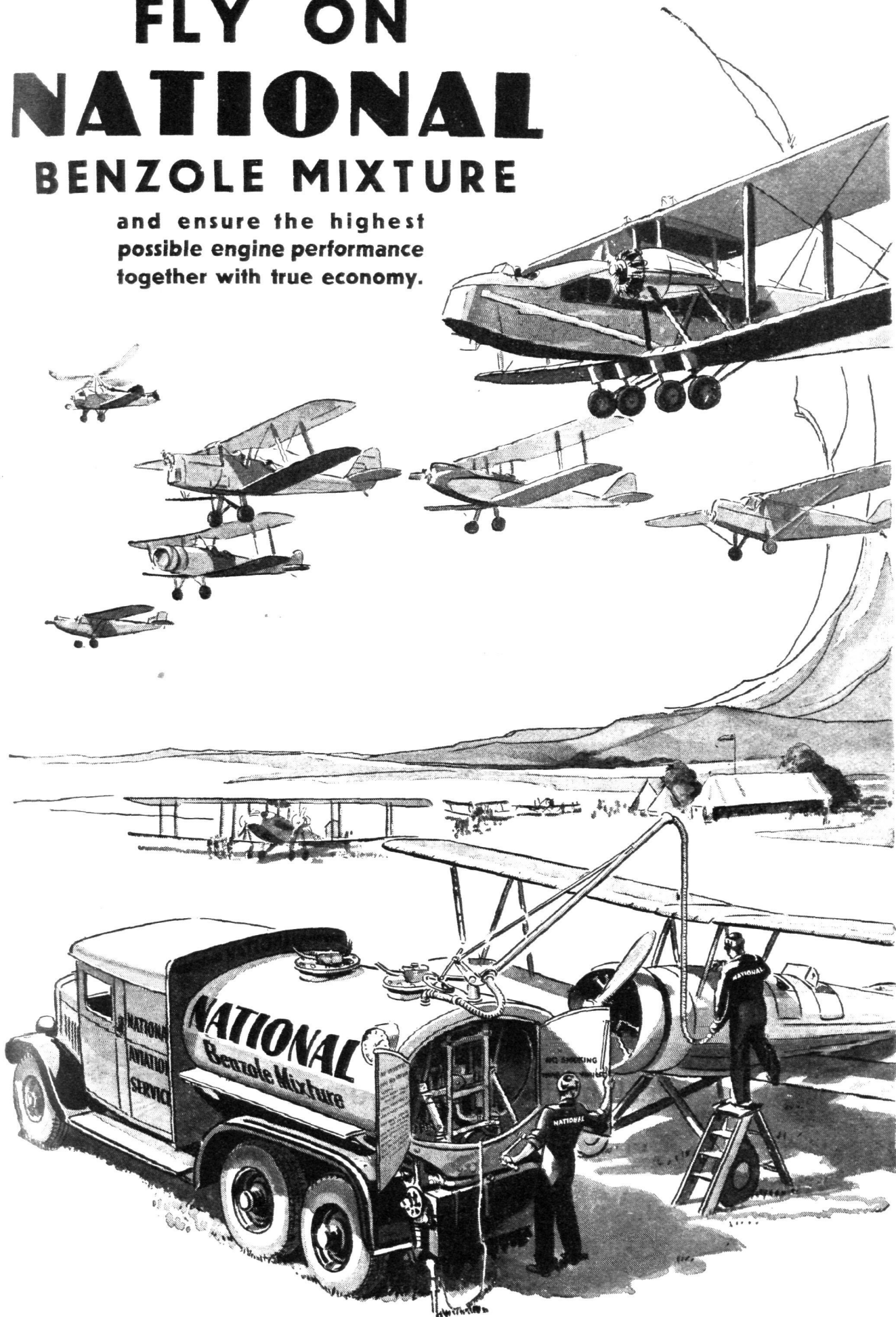
LAWRENCE EVELYN JONES, of Bramham Gardens, S.W., and John Rogers, of Cambridge Terrace, S.W., were each fined £100 and ordered to pay £10 10s. costs at the Mansion House on Wednesday, July 19, for smuggling into the country by air saccharine. Jones, the owner of the machine, and Rogers, the pilot, endeavoured to mitigate the offence by pleading that a desire for sport originated the adventure. Sir Maurice Jenks, however, expressed his opinion that the name of sport should not be so desecrated.

THE END OF A FAMOUS FLIGHT: As recorded elsewhere in this issue, the Mollisons, after accomplishing a magnificent flight across the Atlantic, met with misfortune—happily without very serious consequences—when landing. Twenty-four years ago—on July 25, 1909—Louis Blériot made history when attempting a similar exploit, the crossing of the English Channel. He, too, crashed on landing at Dover, as shown in the accompanying illustration. The progress made in flying since that time is remarkable when we compare his flight with the recent accomplishments of Gen. Balbo and his "Armada," Wiley Post's Round-the-World "trip," and that of the Mollisons referred to above.



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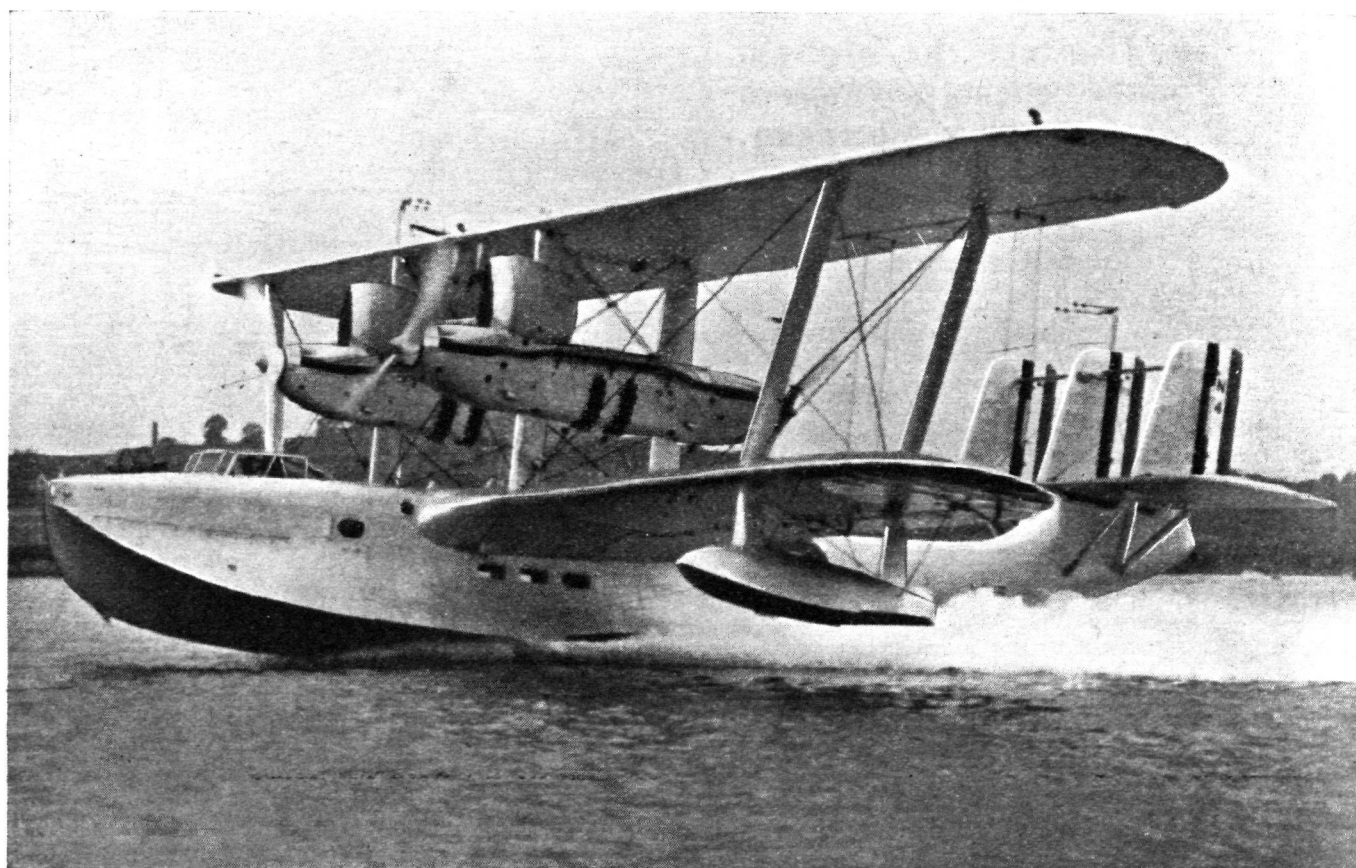


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Edited by C. M. POULSEN

July 27, 1933

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ZAP FLAPS AND AILERONS*

By TEMPLE N. JOYCE, Zap Development Corporation, Dundalk, Baltimore, Ma.

For the last five or six years, the demand on the part of operators for increased high speed has forced designers practically to disregard the importance of the steadily increasing landing speeds of aircraft. During the same period there has been another influence that has allowed us still further to neglect this factor. It is the fact that modern engines are so reliable and forced landings so seldom that their importance was looked upon with more or less contempt. This was particularly true during the boom days when everybody was using a new engine and landing speeds were only thought of in terms of getting into recognised airports. Three things have occurred since then, however, that have again brought to the front the importance of low landing speed: First, a very distinct realisation that the public was afraid of aviation because of high stalling speeds and the frequent crack-ups with serious consequences; second, the fact that increased high speeds could not be obtained without increasing still further high landing speeds unless some new aerodynamic development was brought into existence; third, as speed range and wing loadings went up, take-off run was increased and angle of climb decreased alarmingly.

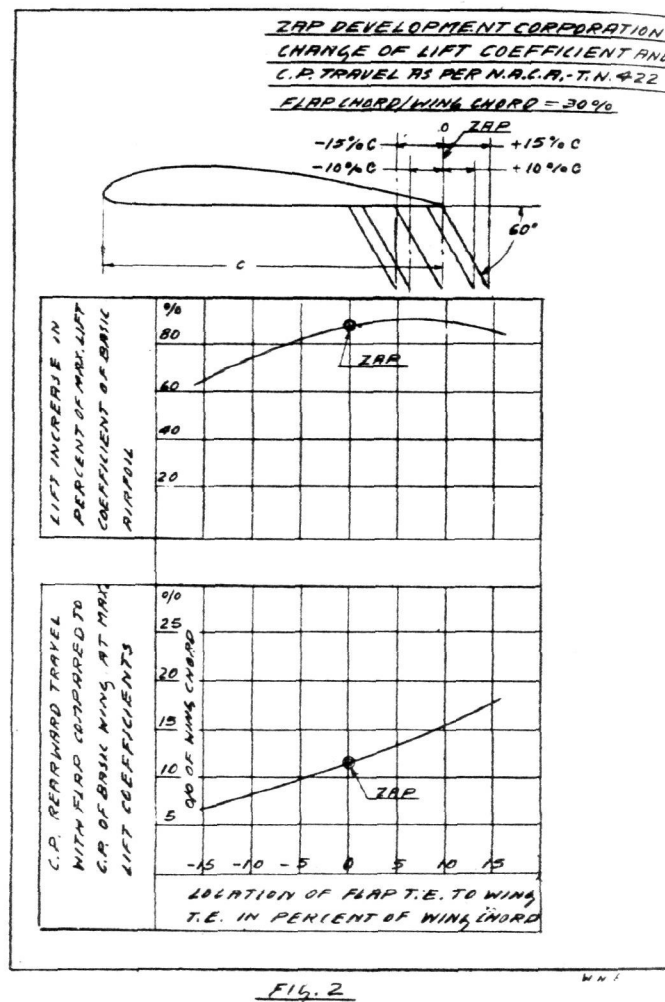
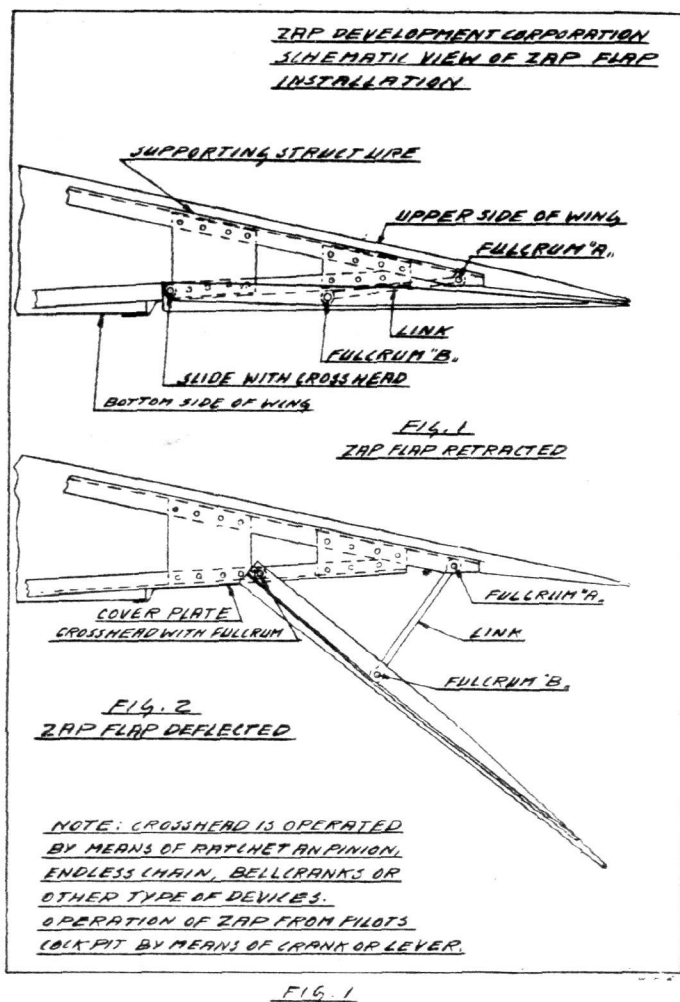
The Zap development is a successful effort to reduce landing speeds without impairing high speed and thereby bring about the best overall increase in the efficiency of an aeroplane with the least added complications. Experimental work on the Zap flap was preceded and stimulated by investigations on a Flettner rotor aeroplane by Mr. Edward F. Zaparka, through the financing of the Chrysler Corporation. Because of high-lift reactions obtained by the change in flow around a cylinder, the research drifted to a practical investigation of the problem of influencing the flow

around an airfoil. The first work was done in a miniature tunnel and later supplemented by larger-scale work in the New York University tunnel under the able consultation of Professor Klemin. Subsequently, the flap was installed on a commercial Aristocrat cabin aeroplane of 165 h.p. and flight tests proved that the flap was very effective. These tests also showed that though lift increases were essential for slow-speed landings, almost equally important was the question of lateral control; Zap ailerons were the result, and will be covered in later paragraphs.

In the spring of 1932 the Aristocrat with Zap flaps and ailerons was presented to the B/J Aircraft Corporation through one of its financial connections in New York. I shall outline here chronologically the questions and answers that were made and the reactions that the writer had to the Zap development because, in all probability, in so doing, it is believed that most of the questions that one would want to know regarding Zap flaps and ailerons will be answered.

Our first impressions at the B/J plant when we were told that a plane was to be sent down to us were that it was just another flap aeroplane and that it would really be a waste of time to look it over, particularly because, to our best knowledge, lift coefficients of 0.0044 engineering units were the maximum that could be expected on a single flap applied to a Clark Y airfoil. When the aeroplane arrived at our field it was observed that it had a split flap and the ailerons were placed above the wing. This caused considerable apprehension as it was felt that the ailerons in such a position would surely be blanketed when the plane was brought to a stall, and would not only be inadequate but dangerous. The writer was quite reluctant to fly the machine at first, but finally did so with the expectation of finding that the ailerons would be completely ineffective at 10 or 15 miles above the stalling speed of the aeroplane. Much to our surprise, they were found to be very effective down to and below the stall of the aeroplane with flaps up, and materially improved when the flaps were down. After a very short flight in the air, the plane was brought down with the conviction that it was a horrible example of an aeroplane but that the flaps and Zap ailerons almost made it a reasonable vehicle. Our next step was to investigate the wind tunnel data which had been carried out by New York University. The results shown in the data presented by Mr. Zaparka were extremely interesting, and the B/J

* Paper presented at A.S.M.E. Chicago Meeting, June 26-30, 1933.



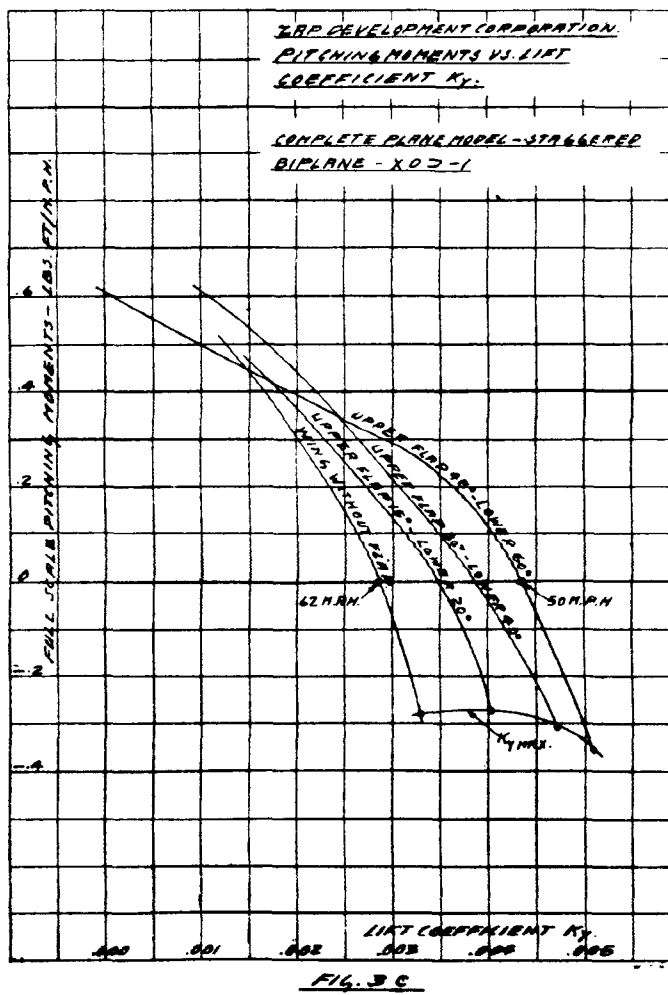
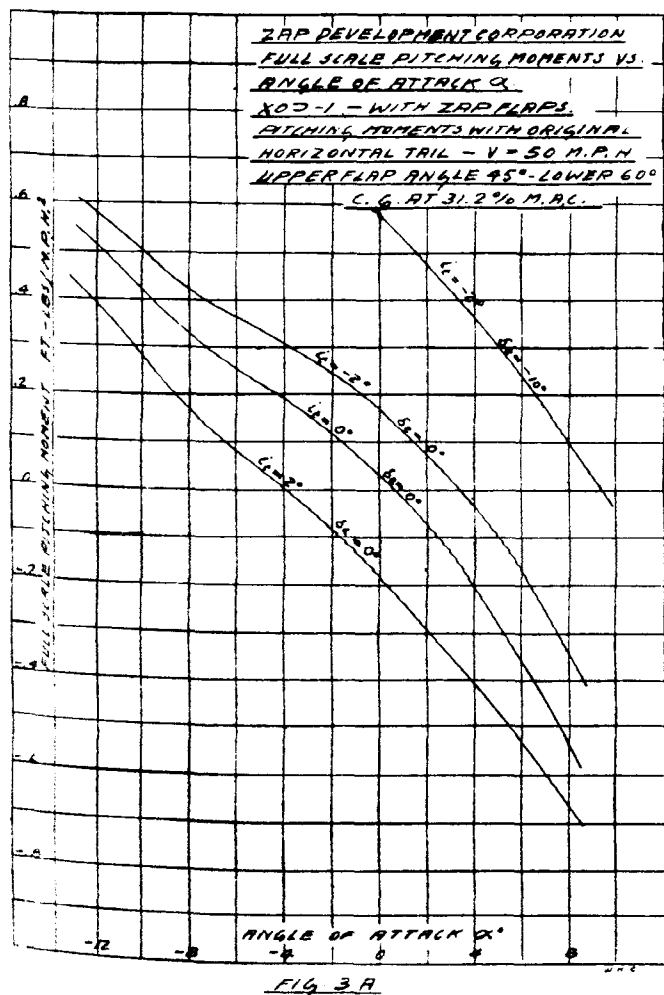
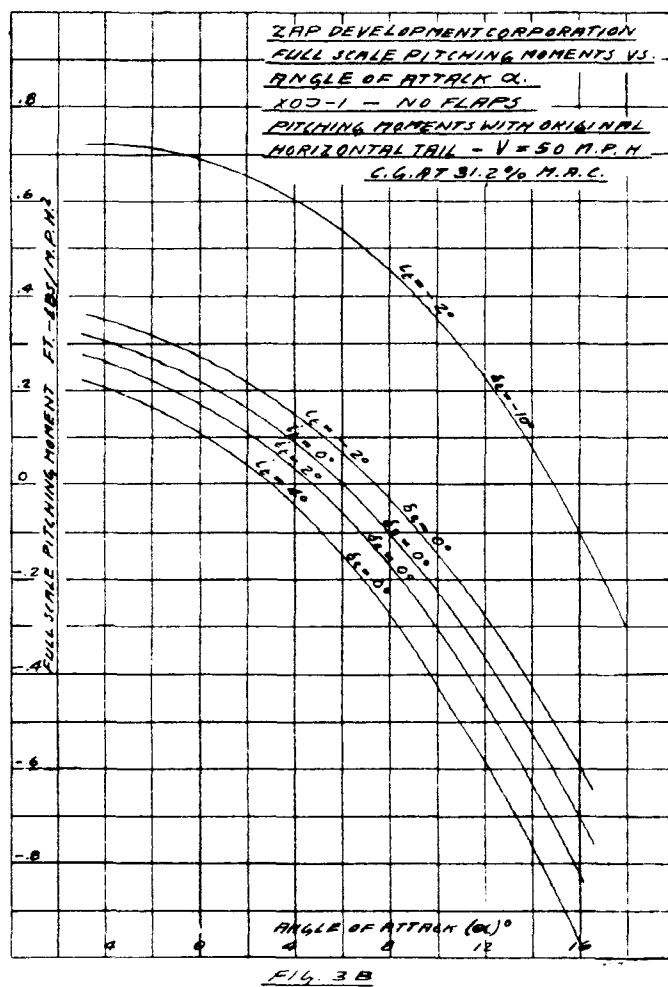
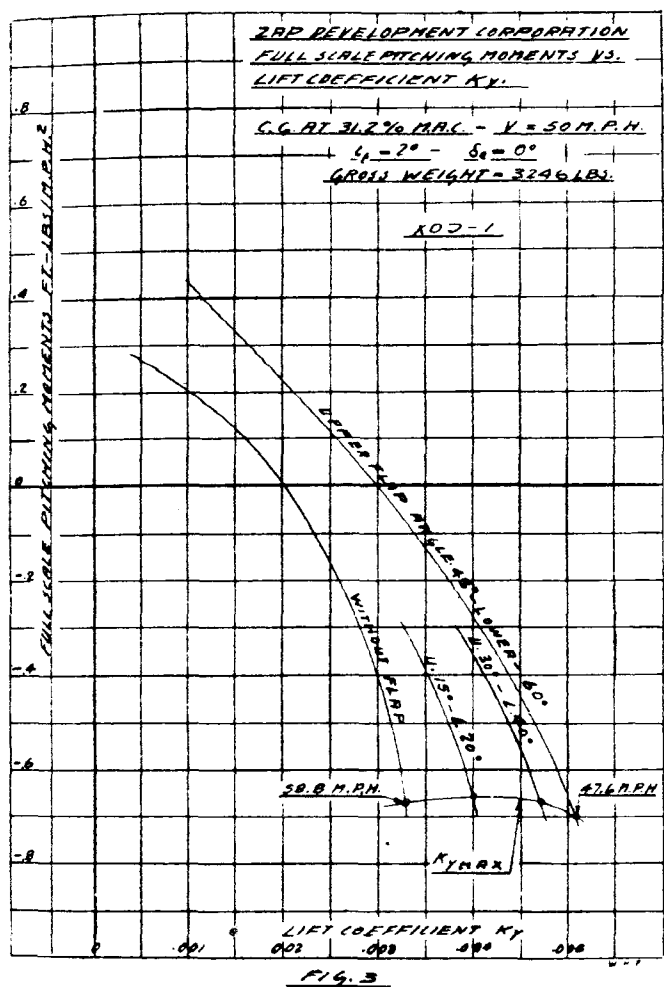
Company requested models from New York University with the idea of checking them in its own tunnel. This was done and the results of New York University as to lift and drag coefficients were substantiated.

The B/J Company had always been extremely interested in slots and flaps and naturally the Zap development fell into sympathetic hands. We had always felt that the success of slow flying, regardless of how it was obtained, whether with slots and flaps, boundary layer control, or any other means, was dependent upon adequate control at the reduced low speeds. When it was found that an adequate slow speed lateral control device was in existence and at the same time did not impair the utilisation of the whole span of the wing to obtain maximum lift increases, our enthusiasm for the Zap combination of flap and ailerons was intensified. In previous designs of a simple flap, as stated before, it was known that the maximum-lift coefficients did not exceed 0.0044, and when the split flap presented possibilities of 0.0065, an explanation of the theory became necessary. It might be of interest to certain individuals to theorise a little on what actually takes place in a split flapped airfoil. With a normal wing, when the simple flap constitutes an actual break in the contour of the upper surface, the increase in lift is primarily due to change in camber, and there is no reaction due to increase of chord or change in flow over the top surfaces other than that which would normally be expected from increasing the camber. With a split-type flap, where the contour of the upper surface of the airfoil is preserved intact, the increase in lift can be divided into three possible heads: first, increase in camber of the bottom surface, which naturally stimulates the flow over the top surface; second, the preservation of the upper surface with the same chord and possibly an increase with certain types of flap movement; and third, a change in flow over the upper sur-

face brought about by the fact that the split trailing edge and undisturbed upper contour creates a combination which causes a further increase in flow over the wing. In the stereopticon pictures which will be shown later the flow reactions back of a simple flap versus the split flap will be seen, and also the effects of moving the trailing edge of the flap forward along the chord. Whether the additional increase in flow over the top of the wing referred to is due to the presence of an area of depression at the trailing edge of the wing caused by the split flap or whether it is due to the displacing of the reversal flow away from the trailing edge so that the bottom surface flow unites with the upper surface flow with less detrimental vortices is a matter for the theoretical aerodynamicists to thrash out. It is a fact, however, that as the flap is moved forward so that the phenomena, whatever it might be, is taken away from its influence at the trailing edge, there is an appreciable loss in maximum lift and is best when the trailing edge of the flap is approximately below the trailing edge of the wing, as is the case of the Zap arrangement. Some very interesting data on lift increase devices has been prepared and published by Mr. Richard M. Mock, a copy of which is attached.

With this explanation, our next question was why the aeroplane did not require greater changes in the horizontal stabiliser to take care of flap up and flap down positions. In Fig. 2 is shown the change in centre of pressure brought about by the use of this particular flap movement on an airfoil and the consequence of moving the trailing edge of the flap fore and aft. In an aeroplane with flaps the centre of pressure travel and effect of changes in angle of downwash must be taken into consideration, and in most cases with the Zap it has a favourable reaction. In Figs. 3, 3a, 3b and 3c, pitching moments of a conventional naval biplane equipped with Zap flaps and ailerons are shown.

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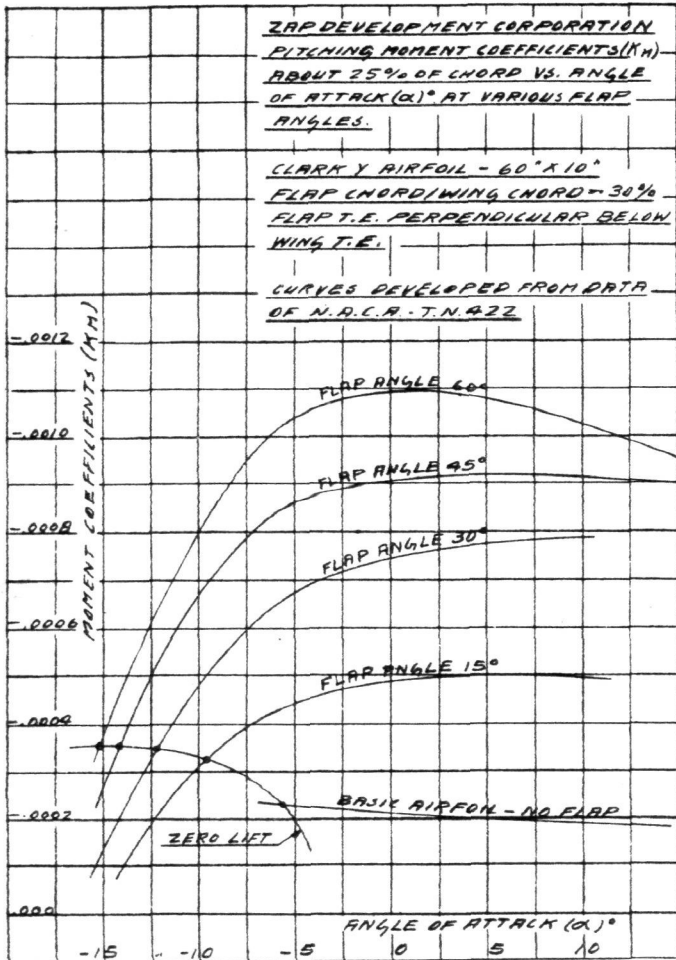


FIG. 3D

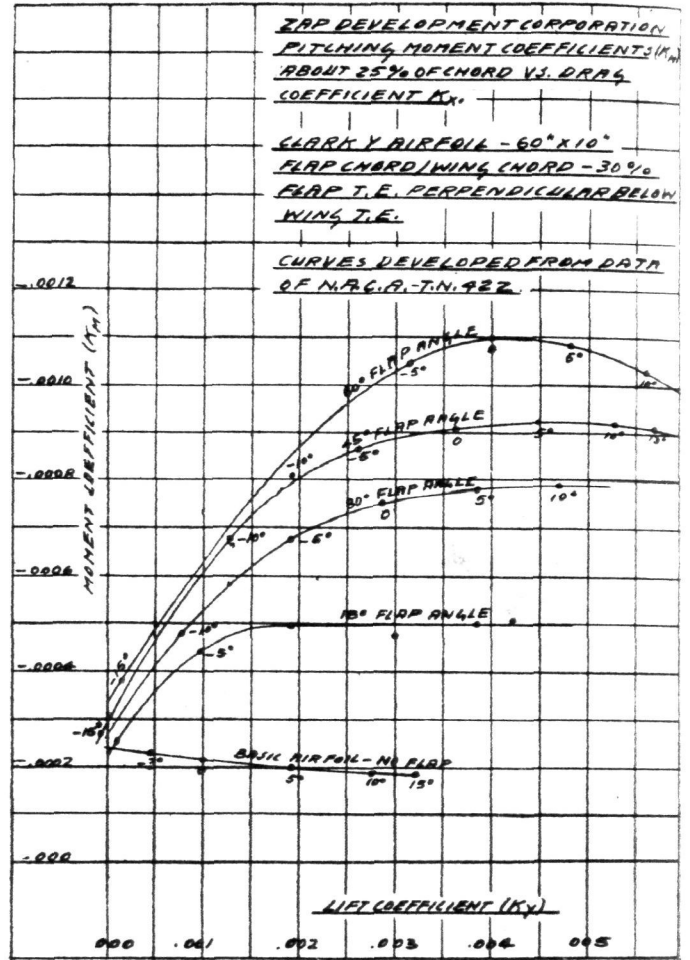


FIG. 3F

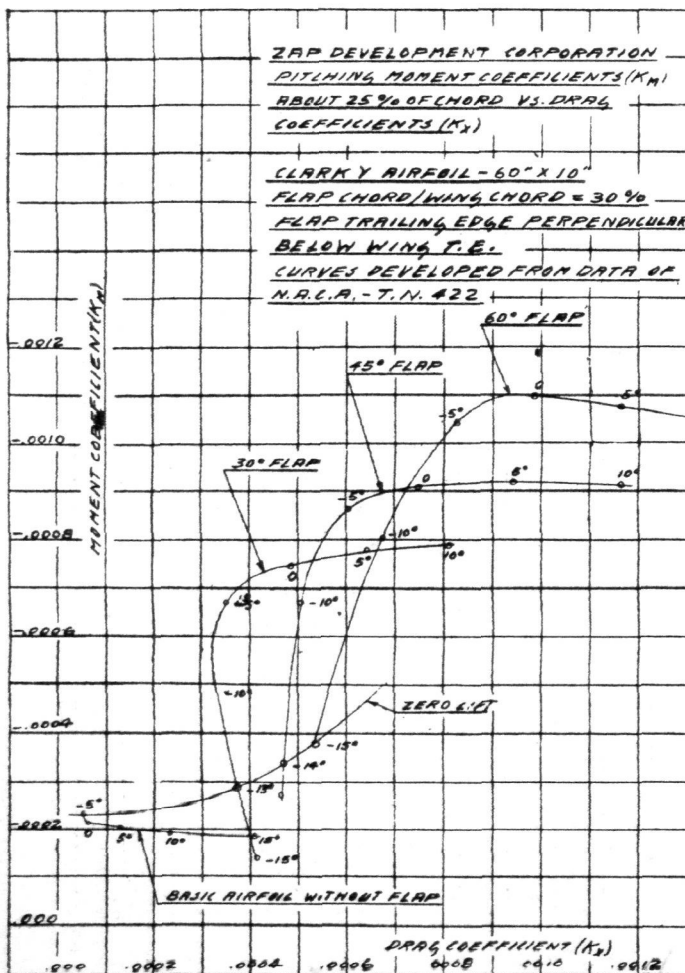


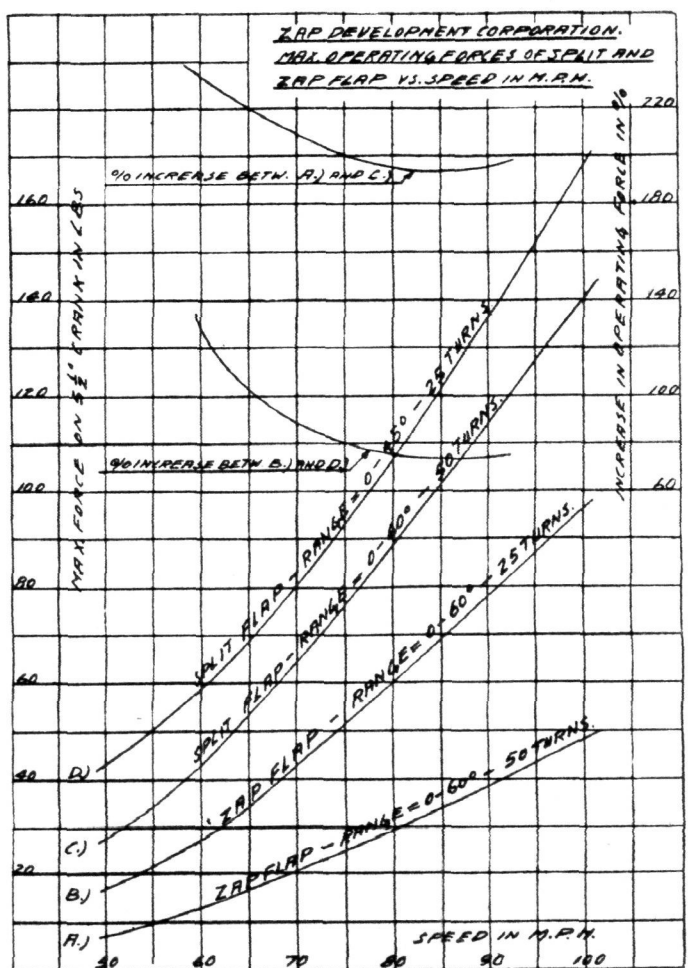
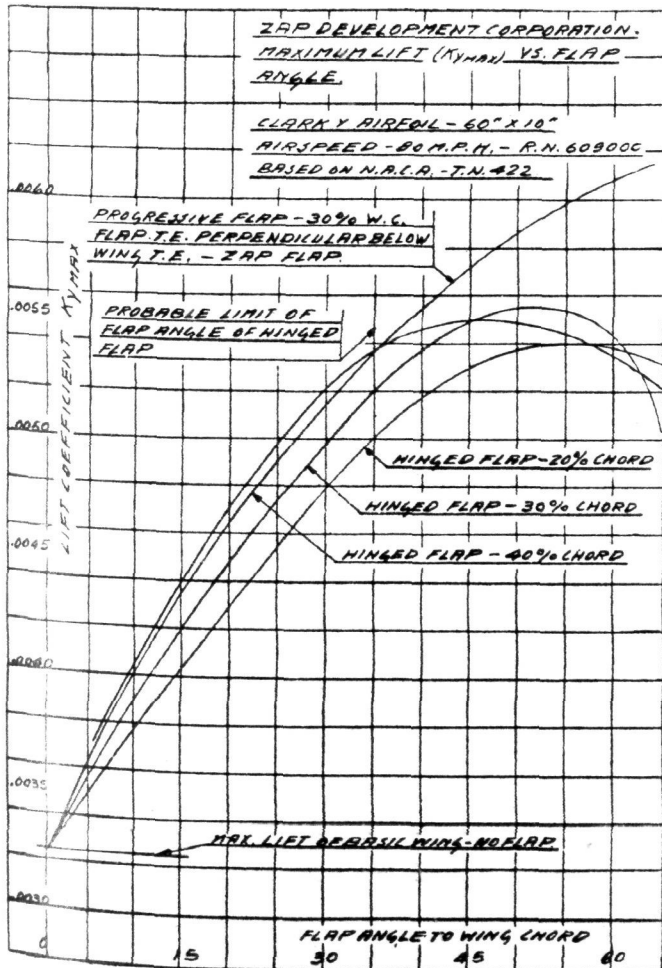
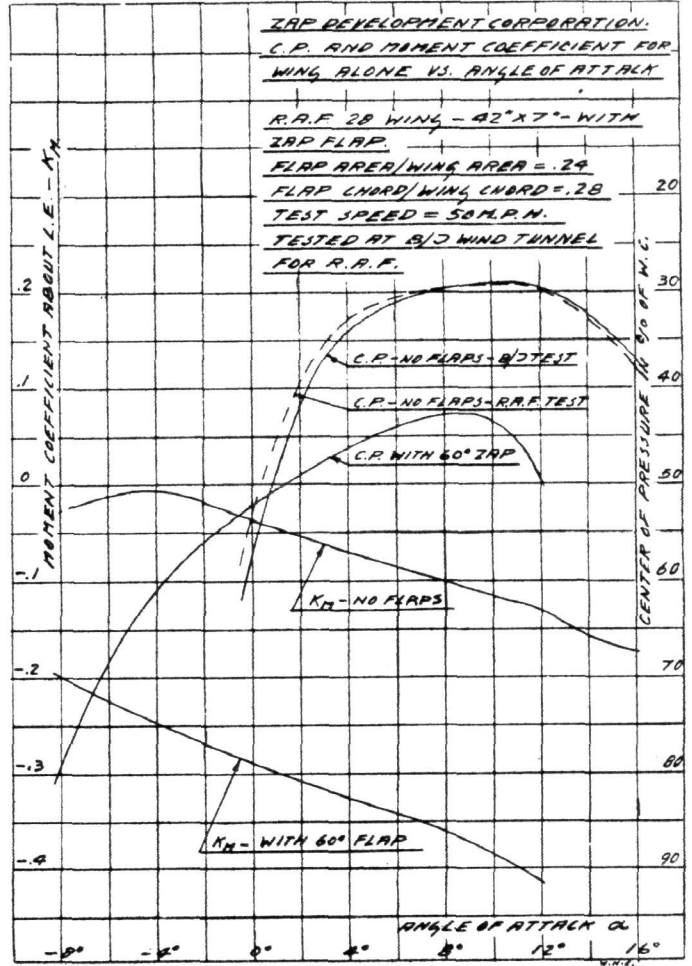
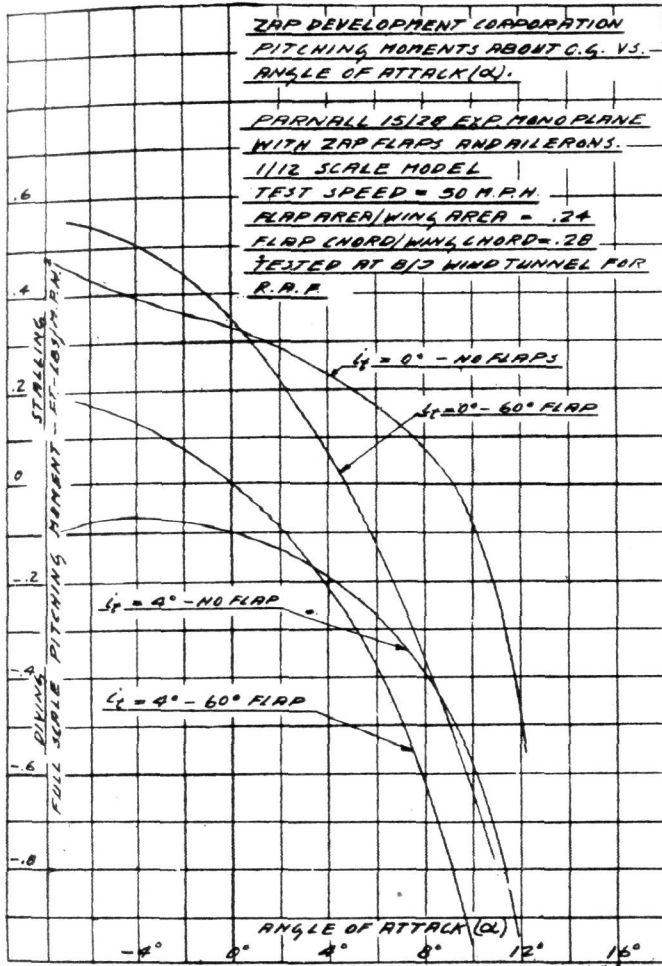
FIG. 3E

Figs. 3D to F give pitching moment coefficients for an airfoil, while in Figs. 4 and 4A the pitching moments of a conventional Zap-equipped monoplane are shown. The net result is that the balance and stability is undisturbed and increases in tail area or abnormal stabiliser adjustments are not necessary.

Our next point of interest, stimulated by the flights of the Aristocrat, was the extremely low operating forces necessary to move the flap down. With a simple flap of the type used on the Breguet observation aeroplanes in France as early as 1917, the forces necessary to get the flap down were excessive, so much so that the flap could only be deflected approximately 30 deg. when usable operating forces and time to operate are taken into consideration. Even if it were deflected to greater angles, the lift coefficients would still be below that of the Zap. (Reference NACA Technical Report No. 422 from which curves on Fig. 5 are interpolated.)

With the straight type of split flap, such as the Wright, where the leading edge of the flap is a fixed hinge, the operating forces are compelled to work against the full aerodynamic load. If the mechanism is of cantilever construction the forces are prohibitive. If it is of a toggle arrangement, which would have to be some modification of the Zap toggle, without the beneficial effect of the sliding front edge, there again the forces are extremely high and particularly excessive at small angles of flap opening. These forces diminish after the flap has caused sufficient drag to slow the plane a great amount. (See Fig. 6 showing relative loads of Zaps versus straight flap for same angles.) The hypothetical aeroplane we used in arriving at these figures had a wing area of 309 sq. ft.; 48 ft. 8 in. span; 83 in. chord, Clark Y airfoil; gross weight, 4,600 lb.; wing loading, 14.8 lb.; power loading, 10.8 lb.; maximum speed of 150 miles per hr. The flap area for both the Zap and simple flap was 30 per cent. of the total area and the flap chord 30 per cent. of the wing chord.

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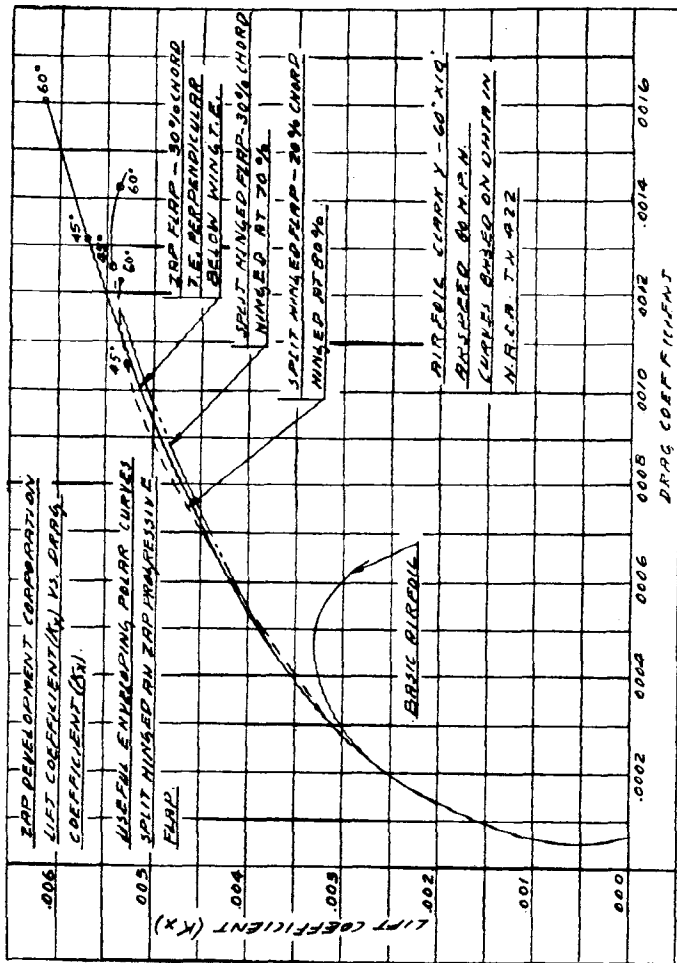


FIG. 7

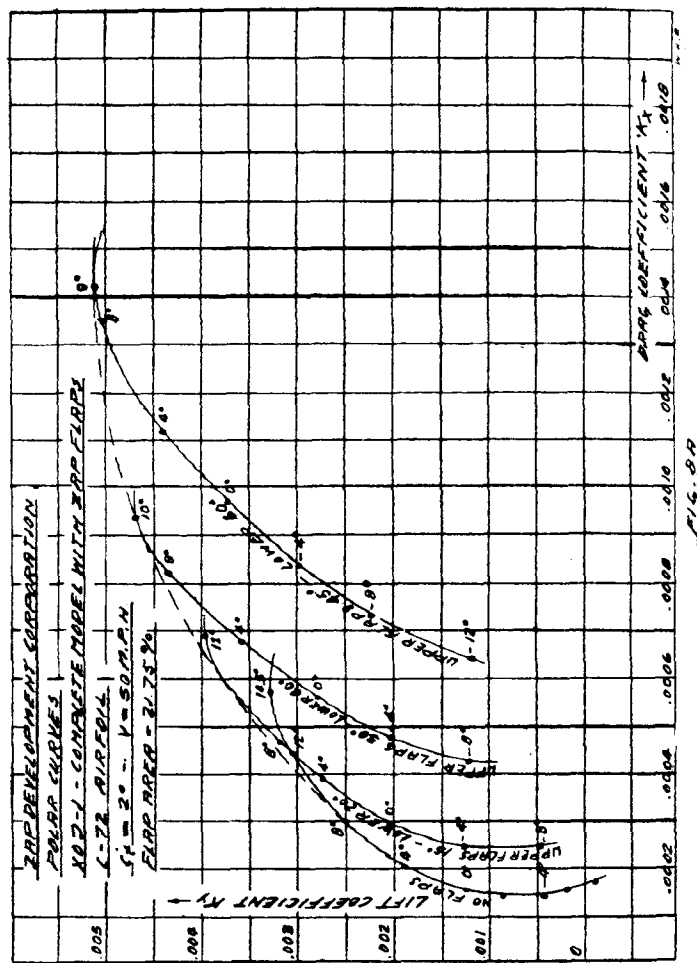


FIG. 8A

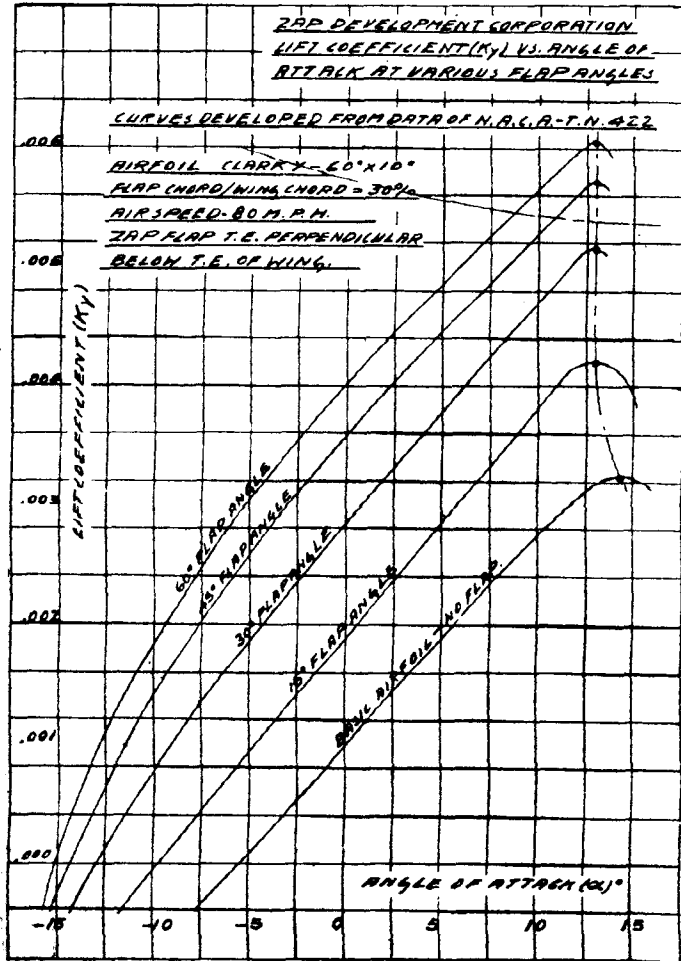


FIG. 8

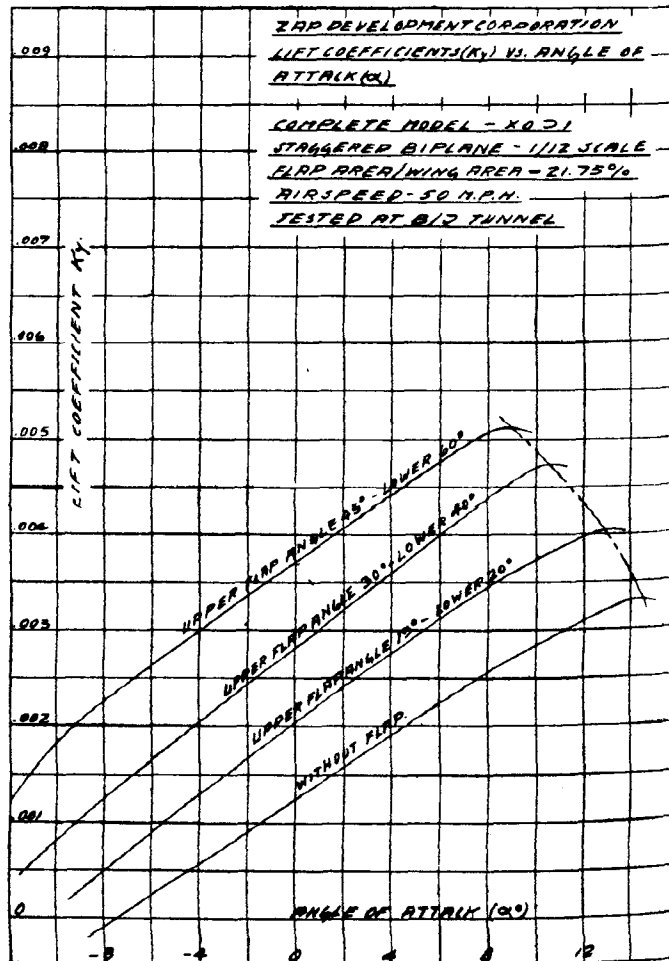
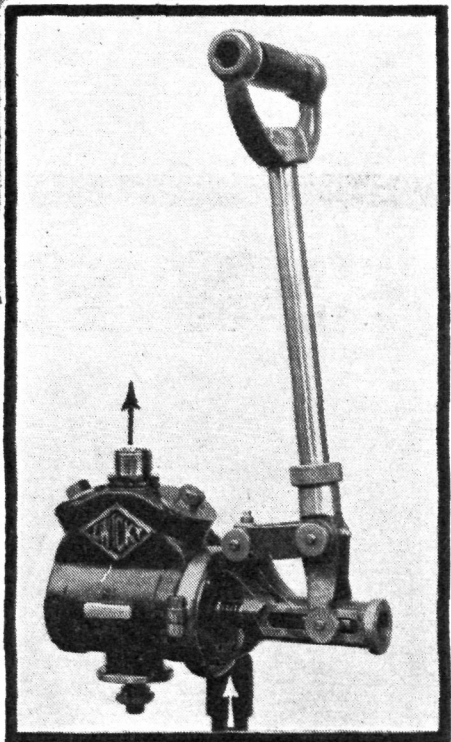
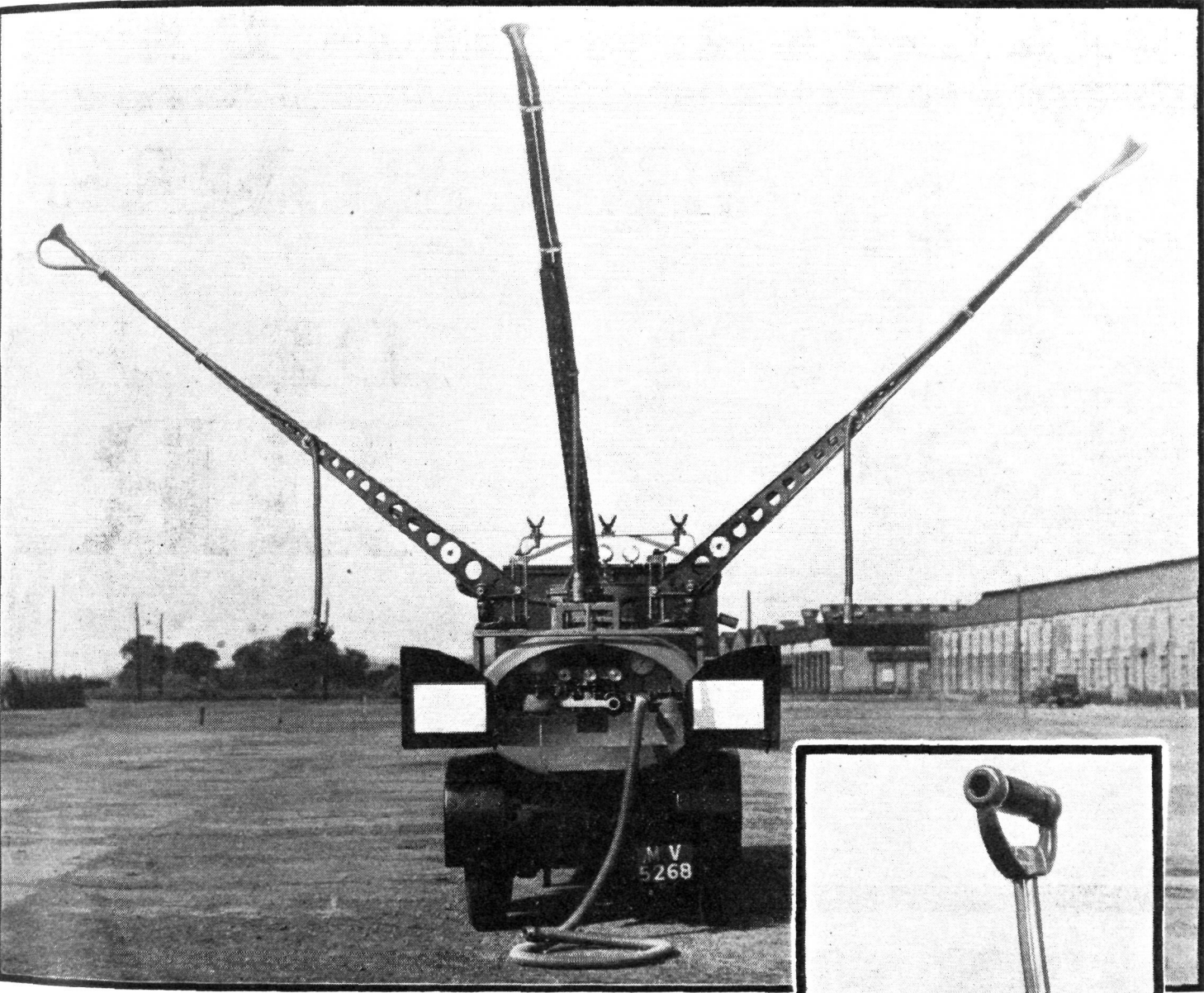


FIG. 8B

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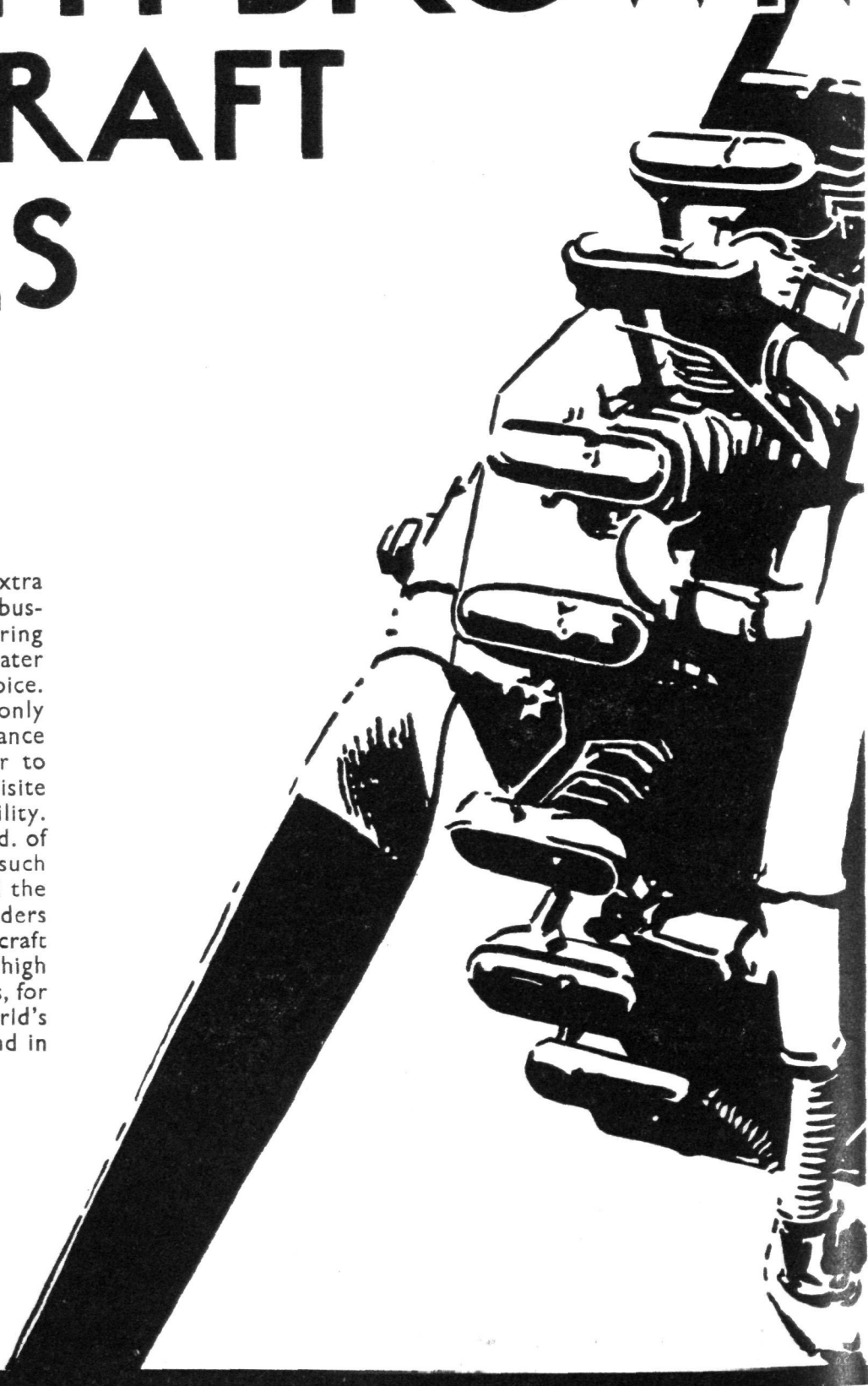
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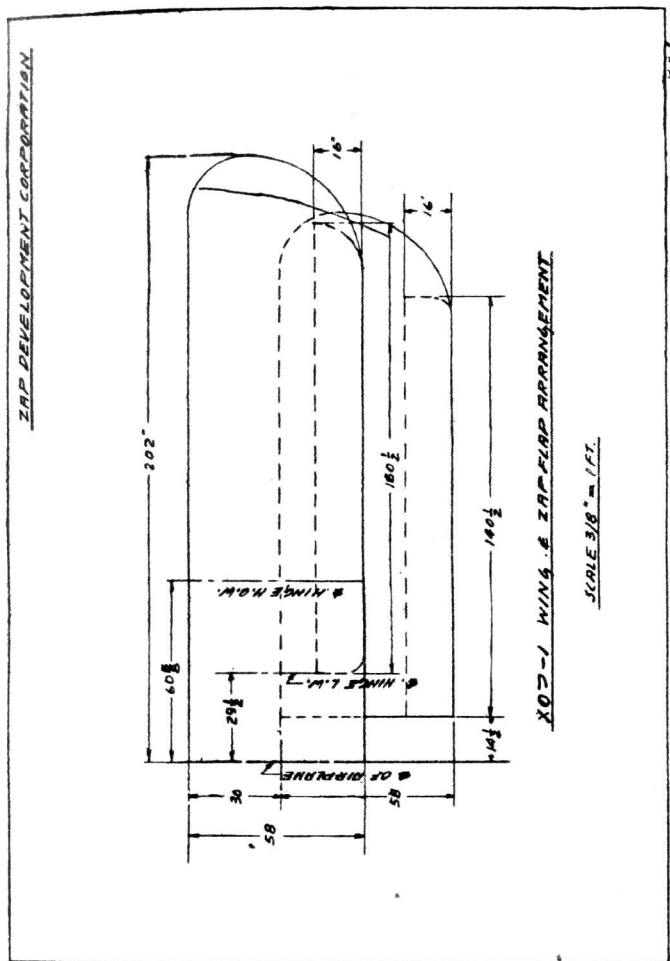


FIG. 8C

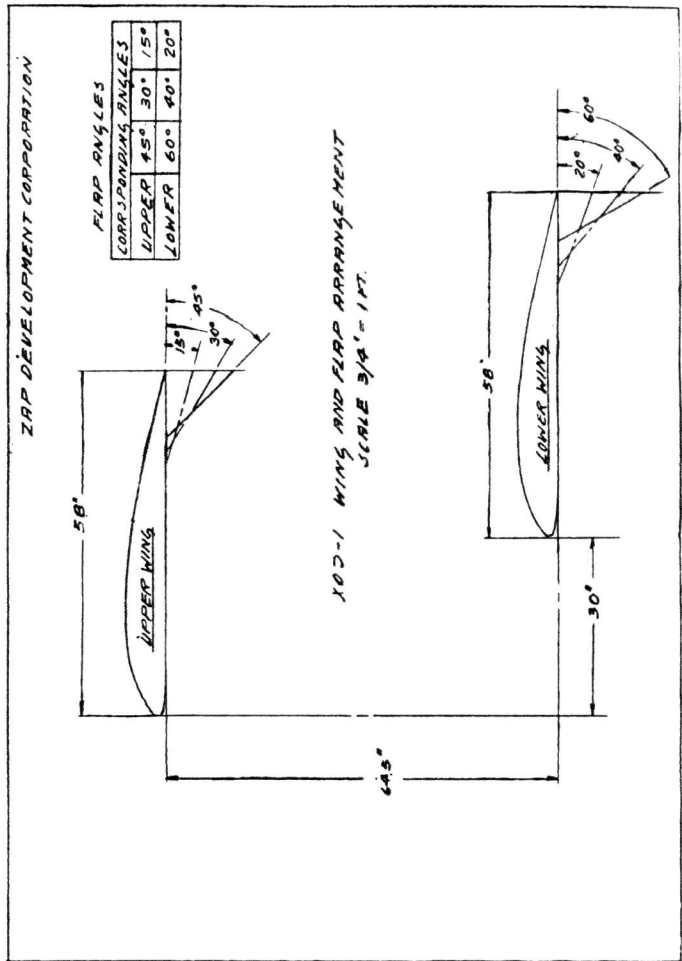


FIG. 8D

The total span of flap was 45 ft. Total area of flap, 93.8 sq. ft. Two calculations of forces were made for the simple flap, one a maximum angle of 60 deg. and the other a maximum angle of 45 deg. The mechanism for operating the simple flap was the most efficient in our opinion, and the geometry chosen seems to be the one requiring the smallest effort on the operating crank handle. The Zap flap geometry and operating mechanism is approximately the same as that developed by the B/J Company when Zaps were supplied to the XOJ-1 observation aeroplane for the Navy. A photograph of the XOJ mechanism is shown in Fig. 13, while Fig. 1 shows a schematic view of the Zap toggle mechanism.

When a comparison of lift coefficients is made, it is seen that even though it were practical, from an operating force standpoint, to get the straight hinged flap down to 60 deg. angles, in order to obtain the benefit of large drag, the lift would be materially less than the Zap flap, and, in fact, less than its own 45 deg. position. (See polar curves, Fig. 7.)

With the Zap type of toggle arrangement, wherein the leading edge of the flap slides back and the toggle is concealed in the wing in such a manner that one end of it is located close to the centre of pressure of the flap and the other fastened to the structure at the top of the rib, it can be seen from Fig. 6 that the number of turns on the operating crank and the forces necessary are extremely low, in fact, with certain types of airfoils, permitting a more favourable geometry of the flap linkage, it will be possible to have actual opening forces.

This phase of the Zap mechanism is extremely important when it is realised that light operating forces have two very important results: First, in that the weight of the operating mechanism can be considerably less, and second, even more important, the fact that in an emergency landing, it enables the pilot to get the flap down quickly. In an existing monoplane which has

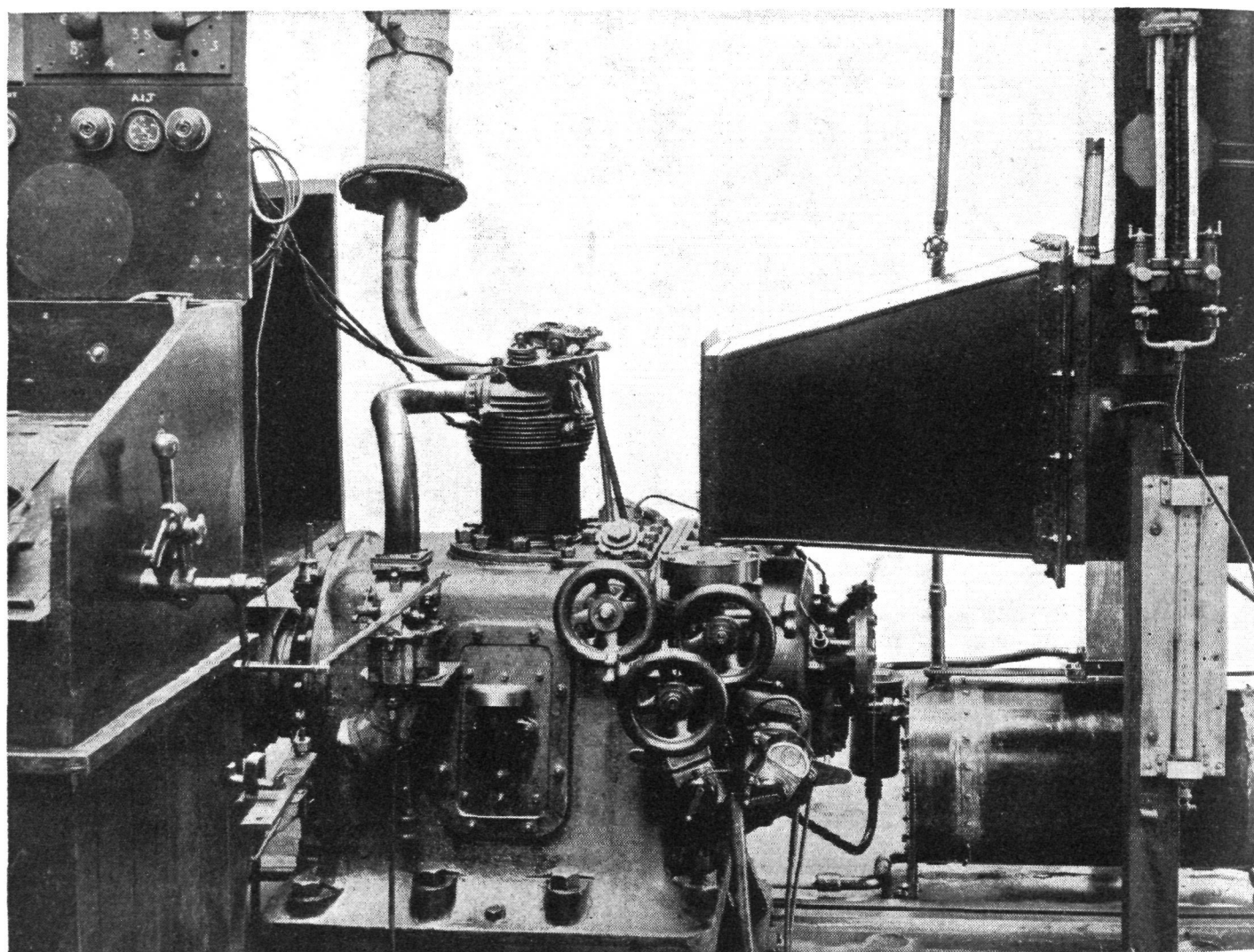
recently been flown in the United States, a straight hinged flap is utilised in conjunction with Zap ailerons for lateral control and the operating forces are so great as to require 45 turns to get the flap down to 45 degrees with a lift increase of only 35 per cent. It can be seen in Figs. 7 and 8 that the maximum lift coefficients of the Zap flap at 60 degrees is 0.00615 and also from Fig. 7 that the straight hinged flap has only a maximum lift of 0.00545. These curves were developed by interpolating the data in NACA Report No. 422, because this report did not test the best Zap flap position but took two flaps on either side of its general location. It must be borne in mind, however, that the angular movement of the flap and the lift coefficients obtainable are intimately connected with the practical results than can be obtained and which, of course, depend upon the operating forces and the time required to get the flap into action at maximum lift. In Figs. 8A and 8B are shown the lift coefficients for a staggered biplane with the different flap settings on upper and lower wings necessitated by the stagger. Figs. 8C and 8D show wing and flap arrangement.

(To be continued)

ENGINE RESEARCH

Engineering is not an exact science. In all probability it never will be. Good design depends upon experience and good judgment quite as much as upon calculation. This applies particularly to the design of cylinders for all internal-combustion engines, but perhaps in the greatest degree to the design of air-cooled cylinders for aircraft engines. There is no doubt that it was these considerations that led the engineers of Armstrong Siddeley Motors, Ltd., to design and produce a research engine of particular merit.

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THE ARMSTRONG SIDDELEY ENGINE RESEARCH UNIT : A "Tiger" cylinder on test, coupled up to a Heenan & Froude Brake. (FLIGHT Photo.)

The general principles of an internal-combustion engine are well known and the science of thermodynamics helps us to understand the behaviour of the cycle of operations and to predict the result of changes in compression ratio, mixture strengths and so forth. There are many things we cannot calculate which are of the utmost importance to efficient running. The best that we can do is to make the design which previous experience has shown to be likely to succeed, and then to determine the exact characteristics of an actual engine and finally to modify the design in view of this experience.

A subject of which little is known is the behaviour of the mixture inside the cylinder, the degree of turbulence set up and finally the rate of propagation of the flame during the firing stroke. Cylinders which are comparatively similar often vary to a marked extent in the amount of spark advance needed to obtain the best results; in fact, the accurate determination of the best ignition point is a good indication of the luck with which the designer has been rewarded in so shaping his ports and combustion space as to obtain the best degree of turbulence. It is generally considered that the less advance needed at a particular speed to obtain maximum power, the more satisfactory is the cylinder likely to be.

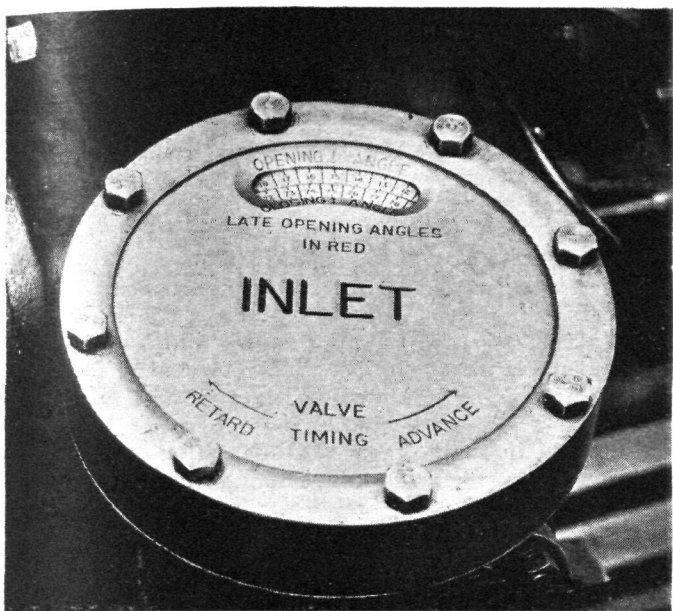
Turbulence and volumetric efficiency are both influenced by valve timing, and while it is generally possible to obtain a good average result by using a standard timing on many types of engines, it is nearly always possible to obtain a slight increase in output and efficiency by finding out for each type of cylinder what is

the ideal valve setting. The Armstrong Siddeley research engine is unique in many respects, chiefly in that it is possible to vary the lift of the valves, their period of opening and also the timing of their opening while the engine is running, and this is done with fixed cams of standard shape. The exact method of carrying out these operations was devised by Mr. Viale, whose ingenuity in designing mechanisms is inexhaustible. The engine is illustrated by photographs showing in particular the dials on which can be read the timing of the valve gear. The unit consists of a substantial cast-iron body, to which can be fitted crankshafts of varying stroke and cylinders of different sizes to cover the range of Armstrong Siddeley aircraft engines. The engine is coupled to a Heenan & Froude water brake of standard design. It is cooled by a draught supplied by an electrically driven centrifugal fan. The compression ratio cannot be varied while the engine is running, but with the attachment used on all Armstrong Siddeley engines it is an easy matter to alter the ratio by fitting lock rings of different sizes.

The valve is lifted through a series of levers so arranged that by screwing in or out a sliding fulcrum the lift of the valve is varied through wide limits. At the same time the initial setting of the valve always remains the same, so that the clearance in the mechanism is constant. It is an obvious advantage that the minimum valve lift shall be used that will give the volumetric efficiency required, and this can be determined with great accuracy by using the variable lift mechanism.

The method of obtaining variable timing is not easy

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THE VALVE PHASE INDICATOR: The exact timing is read off on this. (FLIGHT Photo.)

to follow by diagrams, but the general principles can be understood easily enough. The cam is driven through an epicyclic gear in such a way that the angular position of the cam relative to the crankshaft can be advanced or retarded. This is effected by turning one of the three hand wheels that can be seen in the photograph. The alteration to the period of opening, which is the most original feature of the engine, is effected by introducing into the drive of the cam a mechanism which can impart to the cam an auxiliary motion which is not uniform. When the motion of the cam is speeded up while it is operating the valve, then the period of valve opening is reduced. If it is retarded, then the period of opening is increased. This result is achieved by imparting to the cam a harmonic angular motion in addition to its uniform angular motion, and this is effected by turning one of the other hand wheels at the side of the engine. Both of these operations can be carried out while the engine is running, and the valve timing can be read off in degrees on the dial. There is an exactly similar gear for each valve, so that the timing of the exhaust and inlet valves can be carried out separately.

In actual practice the engine runs very well indeed, and the variable mechanism can be used for long periods without losing its calibration.

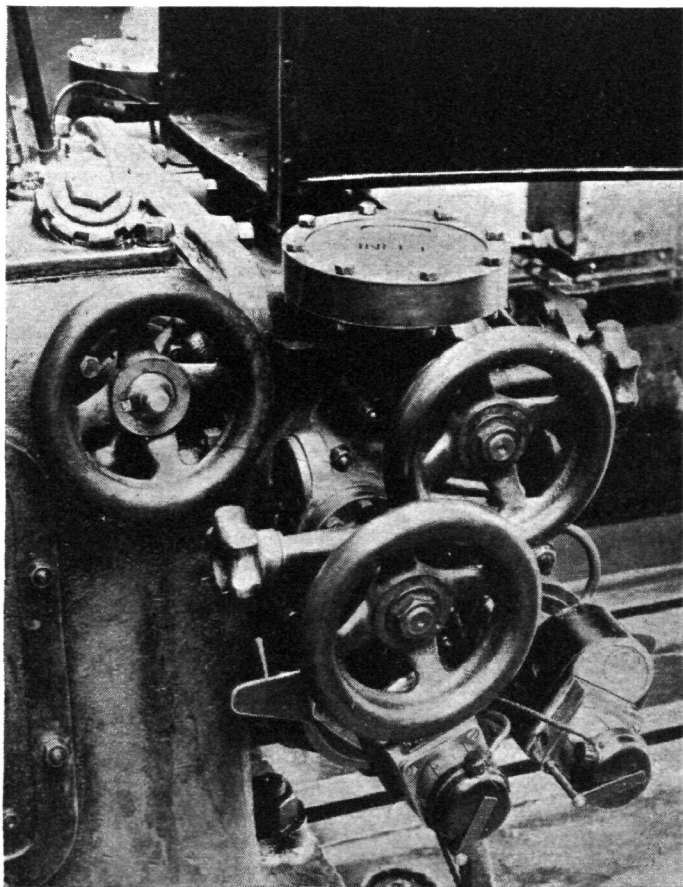
The method of carrying out a research test is, first of all, to run the engine for a considerable time until the temperature of the engine and of the oil has reached a predetermined figure. The engine is then run for a time on full load until the reading on the brake is absolutely steady. Variations in valve timing are then carried out, keeping the engine at a constant speed, and these are combined with different ignition settings. The number of combinations is, of course, large, but the tests can be carried out fairly quickly owing to the ease of making the various changes. The same process is then repeated through a range of speeds. The results are then analysed to find out roughly what is the best setting, and the tests are repeated round about this setting in order to obtain a check and to get still greater accuracy. The whole series is then repeated at a different compression ratio.

Quite a number of other tests are carried out on single-cylinder units. The best clearance for the piston has to be determined, which is done by running at the highest temperature considered safe. The oil consumption necessary to keep the piston and rings in good condition can be determined and on the test unit the oil supplied to the piston can be varied and the consumption

measured accurately. The behaviour of the valve springs can be studied. It is found by practice that the best form of spring can be determined only by experiment, and not directly by calculation.

The chief difficulty with single-cylinder testing is that it is nearly impossible to obtain accurate petrol consumption figures. There is always a certain amount of blow-back to the carburettor, resulting in some petrol being wasted. Various schemes have been used to prevent this, but without success. The usual practice is to determine the petrol consumption for maximum power under each set of conditions by altering the mixture with an adjustable jet. The petrol consumption is determined by a flowmeter, and this is treated only as a comparative figure which will not be directly applied to the complete engine.

It may well be asked to what extent are single-cylinder tests applicable to multi-cylinder engines. Experience over a great number of years has shown that, comparatively at least, the results are always of value. That is to say, the best valve timing for a single cylinder is likely to give the best results on a multi-cylinder engine, and the cylinder which gives the most satisfactory results as a single cylinder will also give the best results on the complete engine so long as the proper attention is paid to distribution and the cooling. The mechanical efficiency of the complete engine is always higher than that of the single cylinder, consequently the brake mean effective pressure for the same induction pressure should be a little higher on the complete engine; and in fact this almost always happens. The chief thing that cannot be determined on the single-cylinder unit, and which is always an anxiety to designers, is the distribution of the mixture on the complete engine. Even if this is not good, it is generally possible to obtain the power that may be expected, but the petrol consumption will be higher because the mixture has to be strong enough for the weakest cylinder and is consequently over rich for other cylinders. There is also a slight



THE THREE CONTROLS: The wheel on the left alters the valve lift, that in the centre the duration, and that on the right the timing. (FLIGHT Photo.)

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risk of obtaining freak results at certain speeds with certain combinations of inlet pipe. It may happen that at some speed there is a ramming pipe effect, resulting in abnormally high volumetric efficiency. This is comparatively rare, and if it does occur it will easily be noticed by an irregularity in the power curve. In general, therefore, single-cylinder results are of great value and are seldom, if ever, misleading to an experienced tester.

Finally, an R.A.E. indicator can be fitted to the engine and indicated diagrams can be obtained under the conditions in which the designer is most interested. While the accuracy is not great enough to obtain the indicated horse-power and from that to find the mechanical efficiency, the diagram is used to obtain maximum pressures and to find out if anything abnormal is happening in the engine. We think that Armstrong Siddeleys are to be congratulated on their enterprise in equipping themselves with such a useful test unit, and we have little doubt that its value will be reflected in their products.

SOME CRITICAL NOTES ON AEROPLANE DESIGN

By ALFRED RICHARD WEYL.

Herr Weyl was formerly Editor of the "Illustrierte Flug-Woche," and also designed and piloted the first Udet low-wing light planes produced in 1922. In the following article he makes some suggestions for directions in which the safety of flying may be increased, although he does not indicate in any great detail the means which he proposes to use for attaining the desired characteristics. Herr Weyl is, of course, writing in a language not his own, and his phraseology is somewhat quaint, but we think our readers will have little difficulty in following his arguments even if they do not agree with them.

(1)—Influence of the Airscrew Arrangement on Stability

MORE or less our aeroplane design has become standardised. Therefore some valuable qualities of now apparently obsolete designs become unknown. The pilot of to-day becomes acquainted with certain fundamental faults of current design practice.

The few old pilots of heroic times have probably long since forgotten that certain of the famous old "box kites" possessed flying qualities now unknown to modern aircraft.

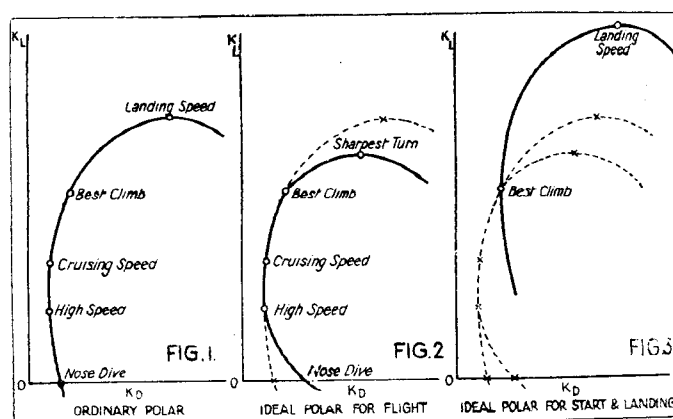
Nearly all modern aeroplanes have tractor airscrews. One can show that such an airscrew position well ahead of the C.G. must result in a detrimental effect to stability.*

In the plane of the propeller disc area a "cross force" arises, if the airscrew shaft becomes inclined to the trajectory of the aeroplane on account of a change in the angle of attack of the single blade while rotating. This propeller cross force may get a considerable value at greater angles of attack of the wing during turns, side-slips, skiddings, aerobatics, etc.† Also, with the aeroplanes of to-day the useful range of incidence is very large.

Now there is a moment induced by this propeller cross force around the C.G. This "cross force moment" of the running airscrew may stabilise any disturbing motion about the normal and lateral axis of the aeroplane, if working in an inverse sense to this motion.

With a tractor airscrew this is never the case. In a tractor aeroplane this moment effects but a marked instability. Pitching and yawing will be enlarged by the cross-force propeller moment. With a pusher, on the other hand, the airscrew produces a stabilising moment.

This fact discloses the remarkable flying experience that most pusher aeroplanes are usually more stable with engine on than with engine off, while conversely most tractor aeroplanes prove a better stability during a glide than in power flight. All pilots agree that the old box-kite pusher planes, the Farman, Voisins, Sommers, and the Wright biplane too, possessed a greater stability with running engine and became somewhat unstable in the glide. Therefore most accidents did occur during glides. With our present tractor planes most crashes begin during the power flight condition, and in sharp gusts the pilot of to-day is accustomed to throttle down for calming his plane during a short glide.



The cross-force propeller moment explains also why most tractor planes with radial engines prove a better stability than the same planes with single-row engines.

It is a fact that many older fighting planes built either with rotary or stationary engines showed a very marked difference in stability, always in favour of the rotary engine. Solely the difference in the distance between propeller disc and the C.G. may explain that difference in flying qualities.

Therefore the designer of aeroplanes should not overlook this influence of the airscrew position. With pushers we may certainly get better flying qualities. Short fuselage noses will be advantageous for stability.

Not in vain the old French designers aimed for the concentration of all loads and the extensive use of short rotary engines. The aeroplane of the near future may show this peculiarity again.

(2)—Correct Shaping of Short Deep Fuselages

The correct shaping of the fuselage with respect to elevator control seems to be an often neglected factor for safety.

Short fuselages of bad form may bring the tailplane at high angles of attack into a burbling zone of dead air. Usually this takes place near the incidence corresponding to best climb. If, with a high-powered plane possessing such a fuselage, the engine stops during a steep climb or in a sharp turn, the plane becomes stalled by itself without allowing for the pilot to get the plane under control at once.

Certain fatal accidents beginning by an involuntary stall during a take-off or in a turn near the ground which have occurred to very experienced pilots may be explained by this fact.

It is quite possible that the air stream at the tail plane breaks down to burbling at angles of attack smaller than the critical angle of incidence for the wing,

* A. R. Weyl, Z.F.M., p. 663, 1931, and p. 688, 1932.

† See Oskar Hermstadt, Z.F.M., p. 59, 1914.

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with missing slip stream. In such cases an aeroplane may stall by itself.

I suspect of such dangerous behaviour all those planes which show a poor elevator effect during a normal three-point landing with stopped engine, *i.e.*, which show a tendency to pancaking suddenly if properly flattened out near the ground. This peculiarity means either a poor wing characteristic—now very rare with planes of modern design—or a getting out of control on behalf of breaking-up of the air flow at the tailplane. During the landing manoeuvre the pilot becomes somewhat helpless without use of the throttle, when flying a plane of this kind. Such aeroplanes will be dangerous during a take-off or a turn near the ground with an unreliable engine.

(3)—Wings with Protruding Rib Webs

The necessity of an efficient lift distribution along the span under all flying conditions, *i.e.*, a slow decrease of the circulation towards the wing tips is well recognised. Better aspect ratios may help. But a good aspect ratio will also create certain disadvantages in design, construction and handling. Therefore the designer should do everything to get a wing of low aspect ratio with exceptionally good aerodynamic qualities. He will get thereby also a high maximum lift coefficient.

Besides other well-known means, there seems to be a very simple possibility of obtaining an excellent lift distribution over the span, like the wing-tip discs of certain tailless planes.

This is provided by wings with protruding ribs, *i.e.*, with rib webs which protrude somewhat over the wing surface into the free air-stream.

A famous fighting monoplane of 1918, the German Kondor-Parasol, "Kon E III," designed by W. Rethel, showed that peculiarity. Every pilot who tried this fast fighter agreed in the exceptionally good behaviour of this aeroplane, especially in turns. The plane showed no tendency of skidding in the steepest, improperly flown turn. It had also an exceptionally low landing speed and a very good climb.

Perhaps this simple system of construction may be a valuable help in the design of a wing of poor aspect ratio, which gives good aerodynamic qualities. Constructionally this method seems to be superior to wing-tip discs.

(4)—Aeroplane Strength and the "Ideal" Polar Diagram

Instead of the "brutal" dictate of a load factor for a given aeroplane structure, the German authorities now have decided to rule individually the load factor by the known or computed values of performance and flying qualities of the plane in question. Each design will so get its own load factor.

Certainly this great progress will be a sane constraint to the designer to think about possibilities of lowering the dynamical loads occurring in flight. If he succeeds, he will be able by the new airworthiness regulation to construct a very light and efficient plane.

Now it is a well-known fact that a fast plane suffers from greater accelerations in flight than a slower one. The aerodynamic refinement will be punished by a higher load factor. The considerable wing structure weights of modern high-speed planes prove it!

From the pilot's point of view, such high load factors seem really useless, or even pure nonsense, because no pilot or passenger will suffer an acceleration of more than, say, 10 G. As an aeroplane will not be built intentionally for carrying dead inhabitants, there will be no reason to construct our planes stronger than, say, ten times a small factor of safety.

Now, with a high-speed plane, there will often be the possibility of getting unintentionally dangerously high accelerations, during transport flight by sudden gusts, and during service flight by sharp turns and aerobatics.

There are remedies for lowering these unwelcome accelerations. Let us consider some of them.

The most important case of loading, and a practical one, is the abrupt flattening out from a terminal nose dive. For that loading three factors are governing, namely, the terminal diving speed, the resulting air force coefficient at the stalling angle (angle of incidence of maximum lift), and the pitching time during a pitching movement of the plane, ranging from the angle of no lift to the incidence of maximum lift. The last factor is a function of the elevator effect.

If we suppose an optimum elevator operation, *i.e.*, a pitching time equal zero, the greatest possible load factor will be

$$L.F. = \frac{K_{L_{max}} \cdot S \cdot \rho \cdot V_d^2}{2 \cdot W}$$

where V_d = the terminal velocity of dive.

Now, may it be possible to diminish the terminal diving speed? Certainly it is! But nobody seems to pay attention to that possibility.

It will not be difficult to invent and to incorporate simple arrangements for obtaining automatically an enlarged drag as soon as the speed of the plane increases over a certain definite limit.

Moreover, certain aeroplanes and even wing sections exist already which prove—wholly unintentionally—that peculiarity aimed at, namely, those planes famous or ill-famed for a slow diving speed. Good examples are the Fokker Triplane and the Fokker D VII of war fame. It is not always the parasitic head resistance which causes a low diving speed.

Apparently the aerodynamical refinements of to-day do not allow for a low diving speed, especially with a high wing loading. But we should regain it. An automatically functioning air brake causing a high drag during the beginning of a steep glide, especially a power glide, may be ever possible without complicating the design.

This simple consideration leads to a thought of a more general character: What characteristics does a high-performance aeroplane need which shall not suffer from high accelerations?

In order to get a survey in that direction, it may be useful to compare the well-known polar diagram of an ordinary aeroplane (Fig. 1) with an "ideal" polar curve for such a high-performance plane, giving low accelerations (Fig. 2).

With the "Ideal polar curve for flight" (Fig. 2), two points are striking. At first the drag coefficient for the incidence of disappearing lift is very much greater than the smallest drag coefficient. This results in a lowered diving speed. Secondly, the maximum lift coefficient remains small and does not surpass markedly the value belonging to the optimum $\frac{k_{L_{1.5}}}{k_D}$.

And what of the landing? the reader may ask. We have already laid it down that this polar curve shall only be valid for the condition of flying itself—not for start and landing.

For these extraordinary flying conditions we have possessed for many years certain well-proved installations in order to produce a high maximum lift coefficient at high angles of incidence, like slotted wings, variable camber wings, wing flaps, split flaps and other useful things. Why not use these? But no aeroplane designer should forget that the corresponding increase of lift has to be used exclusively during starting and landing, never during ordinary flight. Certainly one has often overlooked this necessity, and several somewhat inexplicable disasters may be caused by that reason. For high-speed flying a great lift coefficient results only in very undesired loads and in airsickness too.

Our "ideal" polar curve for flight testifies against automatic regulating wings, *i.e.*, against those wings having any automatic regulations for gaining a high lift coefficient with increasing angles of incidence, like autoslots not fixed in ordinary flight, wings with fixed

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slots (as now tested in U.S.A.), etc. Some grave accidents, due to wing breakage during normal flight, confirm our demand. With wings corresponding to our ideal, even over-balanced elevators or sharp gusts may be without any detrimental effect.

It is a severe error to suppose that the whole range of incidence will be necessary in flight. Good qualities of the polar parts not in use are always disadvantageous. It is only of importance that the polar curve for flight rests steady with greater angles of incidence and does not form a sharp peak, in order that no spinning tendency becomes marked. With low maximum-lift coefficients we are always able to get such polar curves.

The "ideal polar for start and landing" (Fig. 3) shows a wholly different aspect. In this regard low drag coefficients do not interest us. The optimum value of $\frac{k_D}{k_L}$ is seldom of any importance. If a very flat glide becomes necessary, one may glide with the polar corresponding to Fig. 2. Most high-speed planes suffer from gliding too flat into small flying grounds. Therefore, for start and landing only, the value for the best climbing speed $\left(\frac{k_L^{1.5}}{k_D}\right)_{\max}$ becomes essential, and the maximum lift coefficient not at all.

The "ideal" polar diagram indicates, therefore, the way to obtain really light and thoroughly strong aeroplanes. With planes having corresponding aerodynamic characteristics, the designer is able to lower the loads of pulling-out of a dive, of glide, the twisting effort during a dive, the loads of inverted flight, those imposed by sharp gusts and so on. He will also make the piloting more agreeable. He gets an efficient means for diminishing the danger of airsickness, which threatens commercial aviation.

In this way the designer has to tackle some important problems if he wants to get at the root of the evil. He will procure better flying conditions by strictly designing along the path marked by the ideal polar diagram. The resulting plane will be safer. This means also a greater safety in blind flying, especially in approaching the ground in fog or misty weather, on account of the slower speed with the polar curve for landing.

The much-tried and brutal way of limiting elevator power in order to get low accelerations during manœuvres does not seem useful. It does not lower the load imposed by sharp gusts.

Our problem becomes somewhat complicated with military aeroplanes for which the user insists upon high diving speed and high manœuvrability. But also in this respect certain remedies are well possible.

With regard to manœuvrability, it may be sufficient to refer to the fact that it is more efficient to turn slowly on a small radius than to make wide turns with higher flying speed. The possibility for it will procure a wing having variable camber or slots, for example.

What may be done in this way for obtaining low-load factors is shown by the following rough computation:—

1. A certain high-speed transport plane is assumed to have the following characteristics:

Weight full loaded $W = 2.45$ tons.

Wing surface $S = 27.3$ m.²

Wing loading $W/S = 90$ kg./m.²

Maximum-lift coefficient (stationary flying condition without ground influence) $k_{L_{\max}} = 1.7$.

Drag coefficient for the incidence of disappearing lift $k_D = 0.04$.

Therefore:

Terminal diving velocity $V_d = 685$ km./h.

Greatest theoretical load factor of a rapid flattening-out from terminal dive:

L.F. = 42.5.

2. The same plane may be designed following the ideal polar curve for flight, having:

Maximum-lift coefficient $k_{L_{\max}} = 1.0$.

Drag coefficient for the incidence of disappearing lift $k_D = 0.08$.

Therefore:

Terminal diving velocity $V_d = 482$ km./h.

Greatest theoretical load factor of a rapid flattening-out:

L.F. = 12.5.

In every case one has carefully to consider if the lowering of theoretical load factors to about 30 per cent. compensates for the weight and bulk of the installations necessary.

TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH
COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any Bookseller.

IMPROVEMENT OF AIRSCREW-BODY PERFORMANCE BY MEANS OF RADIAL VANES. F. C. Johansen, M.Sc., A.M.I.Mech.E. R. & M. No. 1495. (27 pages and 13 diagrams.) December, 1931. Price 1s. 6d. net.

A noteworthy feature of recent work on airscrew-body combinations* concerns the influence of the airscrew on the pressure over the surface of the body, especially in the neighbourhood of the tail. The chief characteristics of the pressure distribution with airscrew running (by comparison with the pressure distribution over the body alone) are a fall of pressure towards the screw on the upstream side, a rapid rise through the screw to a maximum a little downstream of the screw, a gradual fall to a pressure somewhat below that observed without screw, and finally a sudden fall to marked low pressures at the extreme tail.

Over the normal range of airscrew working conditions, measurements of net thrust have been made with various types of vanes fitted to one tractor and two pusher combinations of a body (fineness ratio 3) and a four-bladed airscrew ($P/D = 0.7$).

The experiments show that suitable vanes reduce slipstream rotation; increase the pressure over the surface of the body, especially at the tail; and so reduce the form drag of the body. Only a fraction of this effect appears as a contribution to net thrust since the drag of the vanes acts in a contrary sense. Over the whole working range of the screw, from the "static" condition up to $V/nD = 0.8$, definite improvement of overall performance is possible, the largest increases of net thrust at maximum efficiency so far observed being:—4 per cent. for the tractor, 10 per cent. for the forward pusher, and 1 per cent. for the after pusher.

There is an optimum size for any pattern of vane, and it appears that vanes in contact with the surface of the body are more effectual than those mounted at some distance away. In the tractor combination the best results are obtained when the vanes are mounted round the maximum section of the body. When the smooth contour of the tractor body is interrupted by an annulus aft of the airscrew, vanes are still effective in improving the overall thrust.

* "Pressure and Force Measurements on Airscrew-Body Combinations," Bateman and Johansen, R. & M. 1380.

THE INFLUENCE OF WING DENSITY UPON THE FLUTTER OF AEROPLANE WINGS. By A. G. Pugsley, M.Sc. Communicated by the Director of Scientific Research, Air Ministry. R. & M. No. 1497. (17 pages and 7 diagrams.) June 21, 1932. Price 1s. net.

In a recent report on wing-aileron flutter Roxbee Cox developed certain elastic stiffness criteria by which the flutter speeds of aircraft of the same wing density might be compared. In the same report, he sought to determine empirically from relevant full-scale data the variation of these criteria with wing density, and gave tentative curves illustrating this variation. These curves indicated that wing density might be an important variable in the flutter problem.

The effects of wing density upon both binary and ternary flutter have been treated analytically and then illustrated by a numerical application of the theory to a particular example. Some consideration has also been given to practical matters affecting the application of the theoretical results to actual aircraft.

It is found that wing density can have an important influence upon flutter, particularly at low densities, and some general information on its effects upon critical speed and frequency is obtained.

* "A Note on the Elastic Characteristics of Aeroplane Wings in their Relations to Wing-Aileron Flutter,"—H. Roxbee Cox (unpublished). Subsequently re-issued in revised form under the title "A Statistical Method of Investigating the Relations Between the Elastic Stiffness of Aeroplane Wings and Wing-Aileron Flutter,"—H. Roxbee Cox. (R. & M. 1505.)

Measured in terms of average weight per unit area per unit mean chord.

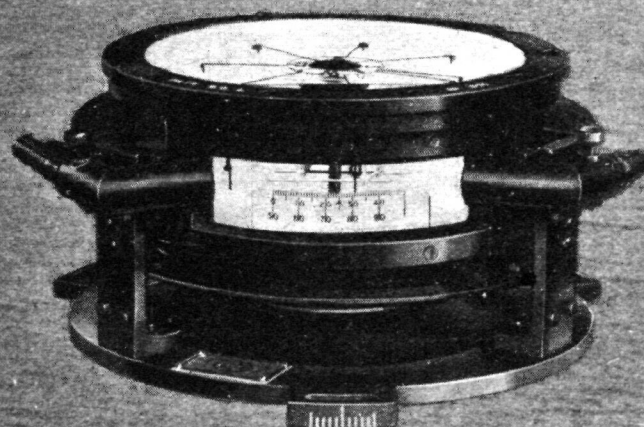
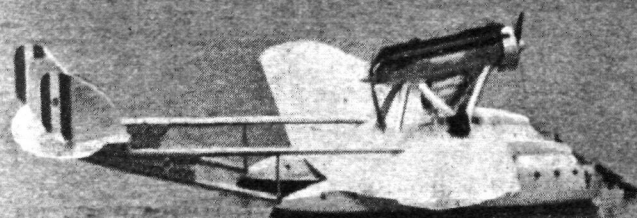


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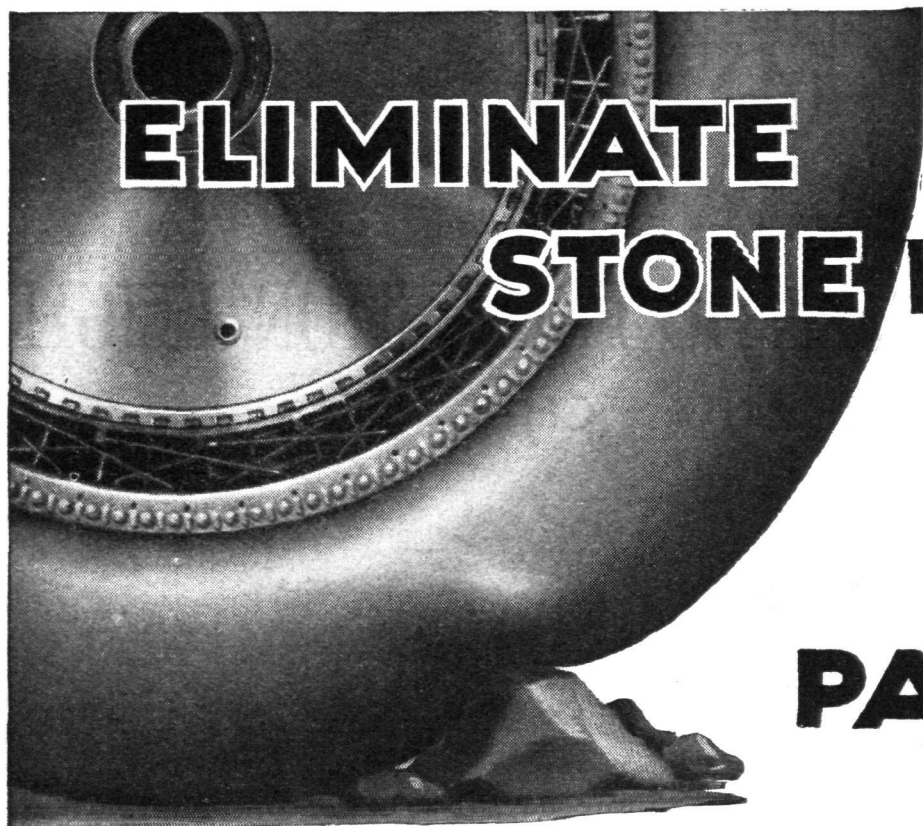
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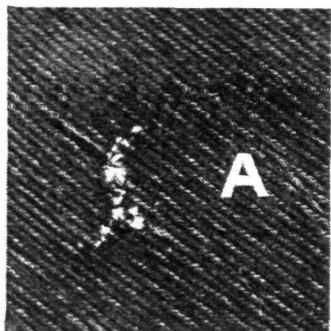
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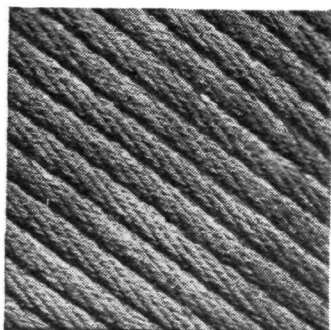
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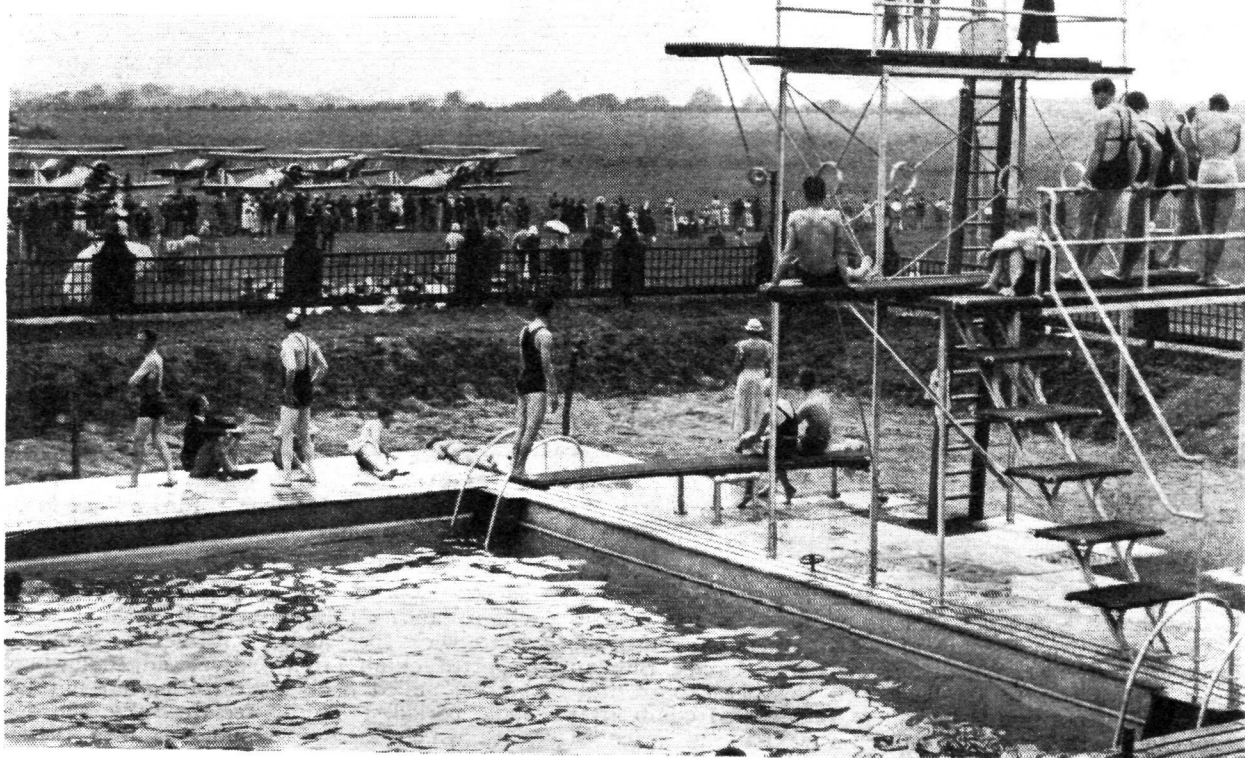
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From the Clubs



A COOL VIEW: Visitors find the high diving board a good grandstand. F/O. Murray flying past in the "Cutty Sark" of A.S.T. The Avro "Cadets" are also from A.S.T.

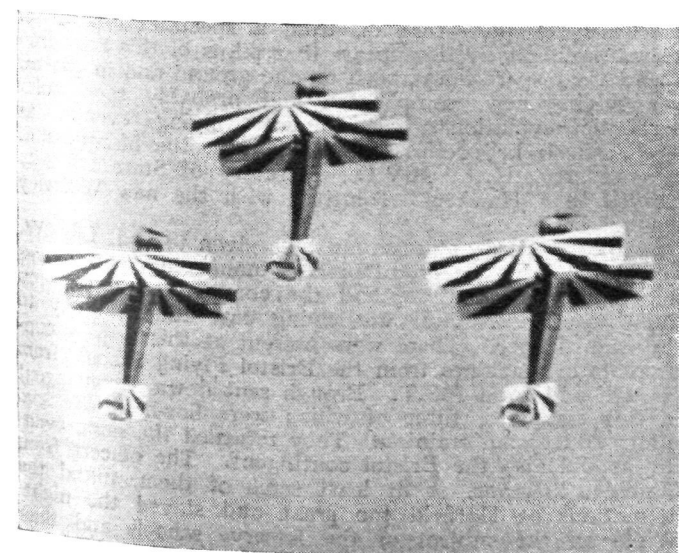
R.A.F. RESERVE FLYING CLUB

THE promoters and organisers of the first display to be held by the Royal Air Force Reserve Flying Club are to be heartily congratulated. Hatfield Aerodrome is, of course, a very pleasant place, the clubhouse delightful, and the swimming bath a great asset, especially on a hot day. These, however, were only incidental to the success and smooth running of the Saturday afternoon of July 22. Nothing went wrong for the very simple reason that everything went right, and that was due to but one thing, organisation that had paid the greatest attention to even the smallest detail. The display was not on a large scale, and there was not

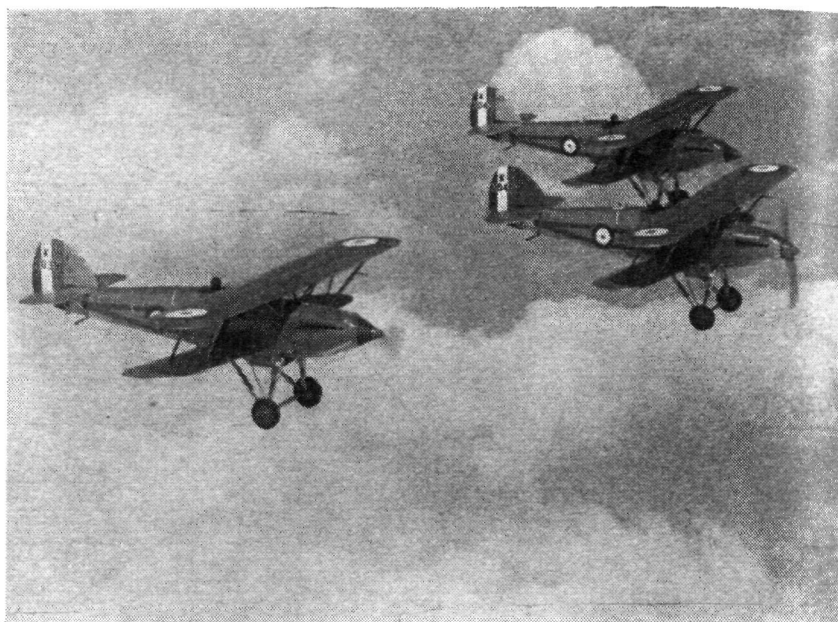
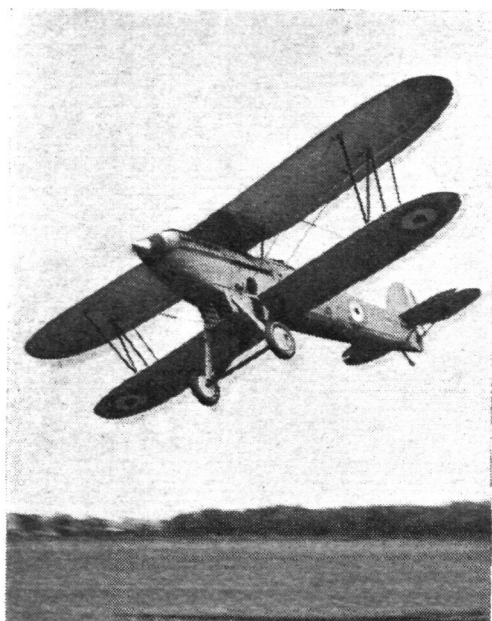
an overwhelming crowd to be looked after, which no doubt had much to do with the enjoyment which everyone experienced during the afternoon and evening, for quality is generally a greater asset than quantity. As regards the flying, there again quantity gave way to quality, and quality, indeed, of a high order. In fact, everything was of the best, Providence provided a glorious day, de Havilland's an excellent aerodrome, the company—well they provided themselves—and F/O. R. E. G. Brittain and his band of willing and able helpers saw to it that all present were enabled to spend a very enjoyable afternoon and evening.

The programme started off with the launching of the Club's first machine, a "Gipsy Moth," by Mrs. Leckie, the wife of Group Capt. R. Leckie, the Superintendent of the R.A.F. Reserve. This machine looked very smart with its tail painted in the colours of the Royal Air Force, red, dark blue and light blue, and a shield of the same colours, with Reserve Flying Club written across it, emblazoned on the fuselage in front of the wings. Flt. Lt. W. E. P. Johnson, A.F.C., R.A.F.O., then took up a D.H. "Tiger Moth" and gave his usual polished demonstration of inverted flying and aerobatics. The next item was a fly past by instructors from the various Reserve training schools. Air Service Training were represented by Flt. Lt. R. P. P. Pope, D.F.C., flying an Avro "Cadet" fitted with a "Genet Major," and F/O. W. F. Murray flying a Saro "Cutty Sark" with two "Genet Majors." The Bristol Aeroplane & Motor Co. by F/O. T. W. Campbell flying a "Tiger Moth" ("Gipsy"). The de Havilland School of Flying by F/O. A. J. Harris, also on a "Tiger Moth." The North Sea Aerial & General Transport Company by Flt. Lt. A. G. Loton on a Blackburn B.2 "Trainer" ("Gipsy III"). It was a very staid fly past, but that was as it should be, since all the pilots were instructors.

Flt. Lt. P. W. S. Bulman, M.C., A.F.C., R.A.F.O., then took off in a Hawker "Fury" (Rolls-Royce "Kestrel"), and everyone came out of the clubhouse and on to the veranda. Among the perfect manoeuvres through



THE TOP SILVER SIDE: Three "Tutors" from C.F.S.



ALL "KESTRELS": Flt. Lt. Staniland in a Fairey "Firefly" and three Hawker "Furies" of No. 1 (Fighter) Squadron, all with "Kestrel" engines.

which Flt. Lt. Bulman put his machine were two especially worthy of note; one, a long climb but a few degrees off the vertical, at the top of which, when it seemed the machine must surely fall out of the pilot's hands, Bulman flicked it over on to its back and then half-rolled into normal flying position; the other, an inverted climb after a dive with the throttle pulled back for the space of 10 sec.

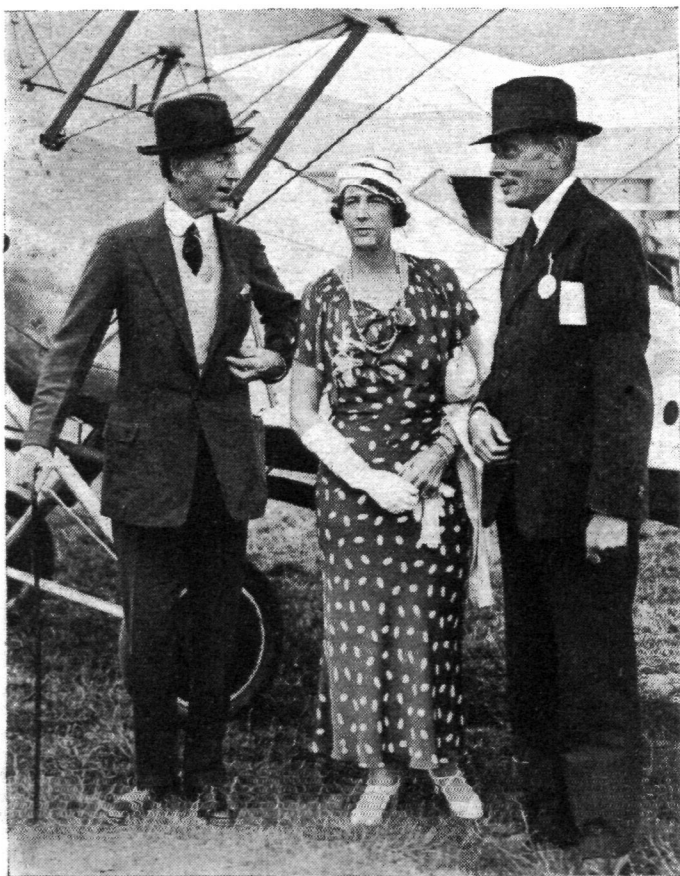
After Mr. John Trantum had successfully done his usual parachute drop, Flt. Lt. C. S. Staniland, R.A.F.O. took up a Fairey "Firefly," also fitted with a Rolls-Royce "Kestrel." It was noticed that this machine had Belgian markings. His three full rolls across the aerodrome at a height of only a few hundred feet were beautiful to watch,

as 'were also his continued rolls about a vertical axis in a climb, and his tight vertical turns round the enclosure were very spectacular. Flt. Lt. Staniland also did an inverted climb after a dive and, following Bulman's example, pulled back his throttle, but not for quite such a long period. To appreciate fully the remarkable skill with which these two pilots handled these two machines the spectator must needs be a pilot of more than a little experience. Both demonstrations were very convincing and evoked exclamations of admiration from many of the best judges present.

Three pilots from the Central Flying School, Flt. Lt. H. A. Constantine, F/O. H. J. Pringle and F/O. P. B. Coote, then took three Avro "Tutors" ("Lynx" engines) into the air and climbed to a height of 2,000 ft. in perfect formation. While they were so doing, No. 600 City of London (Bomber) Squadron flew past in formation, punctually to the time appointed on the programme. The C.F.S. instructors provided quite a little thrill to those who were watching carefully. When flying in formation at barely 1,000 ft. over the enclosure, with the leading machine inverted, the left wing of the machine on the right very nearly touched the leader's right wing as the latter rolled over to normal flying position. The landing of these three machines was as perfect as a formation landing could be.

The last event was a demonstration of flight aerobatics by three pilots of No. 1 (Fighter) Squadron flying Hawker "Furies," the pilots being Flt. Lt. O. E. Carter, F/O. H. Pilling and Sgt. Plt. C. Scragg. They did their usual "flight roll" which disproves the proverb "Familiarity breeds contempt," that is, from a spectator's point of view. Incidentally, it appears that pilots of this Squadron spend their spare hours both on the ground and in the air in evolving new, complicated and probably spectacular aerobatic evolutions. During the flying events, at 4 o'clock to be precise, the Most Hon. the Marquess of Londonderry, K.G., M.V.O., Secretary of State for Air, arrived in a Hawker "Tomtit" with the new Wolseley engine.

A special word of praise must be given to Sqd. Ldr. W. Helmore for his clear and precise announcing, and it was very noticeable that he had the common sense to keep quiet when a machine was flying past and so likely to drown his voice. There were present at this display contingents of machines from the Bristol Flying School, from Brough and from A.S.T. Brough sent down a contingent of five machines, three of which were flown by Reserve pilots undergoing training. They returned the same evening as did also the Bristol contingent. The officers from Hamble, however, or at least some of them, found the attractions at Hatfield too great and stayed the night. While on the subject of the Reserve schools and their machines it might be mentioned that some of the registration letters were peculiarly suitable and in one case, perhaps, even significant. For instance, one of the Bristol



OFFICIAL APPROVAL: Lord Londonderry, Secretary of State for Air, Lady Londonderry, and Marshal of the Royal Air Force Sir John Salmond.

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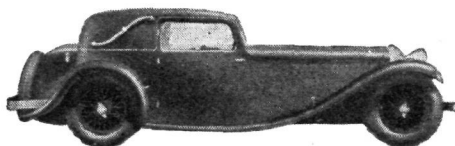
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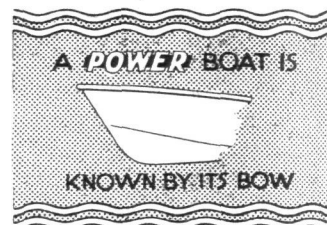
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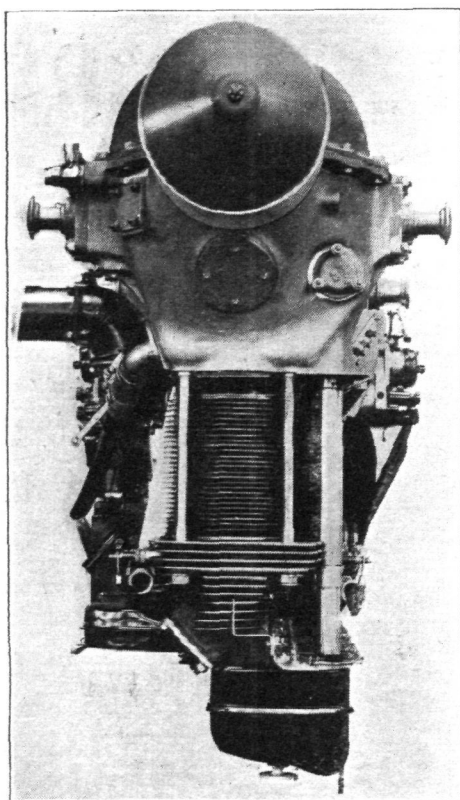
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LAUNCHING OF THE CLUB'S FIRST MACHINE : Mrs. Leckie beside the Club's D.H. "Moth." The shield has the colours of the Royal Air Force.

machines possessed the letters S.W. (a little problem for the inquisitive); one of the de Havilland School machines possessed the letters D.H. (obvious); and the "Cutty Sark" from Hamble had the significant letters G-ACOP. Had Lord Trenchard been present he might have noticed this, perhaps with pleasure.

The majority of the people who attended the display stayed on afterwards to bathe, dine, dance and discuss many matters of great and little importance, as is the custom where two or three are gathered together in the name of aviation.

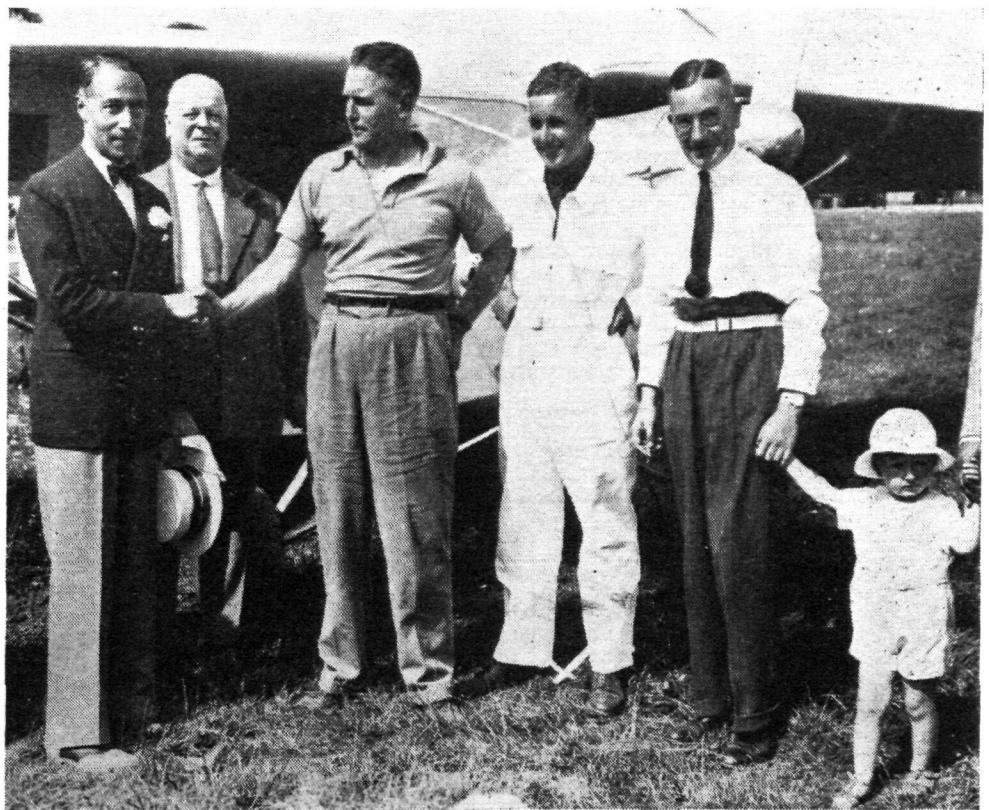
And so has been inaugurated the Royal Air Force Reserve Flying Club, which has been formed to provide cheap flying for pilots who have at one time held commissions in the Air Force or the Reserve, which, of course, includes the Oxford and Cambridge University Air Squadrons. F/O. R. E. G. Brittain and those who have worked with him to form this Club are to be congratulated on the success which has so far attended their efforts. They have chosen an excellent aerodrome from which to operate, and from the list of Vice-Presidents, which includes Sir C. Ll. Bullock, the Director of Training, the Superintendent of the Reserve, and the Director of Civil Aviation, it appears the Club has the official blessing of the Air Ministry. The President of the Club is Marshal of the Royal Air Force Lord Trenchard, G.C.B., D.S.O., D.C.L., L.L.D., and here, too, the Club must consider themselves to be highly honoured, and it is always nice to have the police on your side. Among other people who helped to make the meeting a success were Sir H. Brittain, K.B.E., C.M.G., L.L.D., Flt. Lt. R. W. Reeve, D.F.C., M.M., Aerodrome Control Officer F/O. A. G. Lamplugh and F/O. W. A. Hammerton.

CARDIFF'S ANNUAL AIR DISPLAY

THE Principality during the past few months has been showing increasing indications of air-mindedness, fostered by the Cardiff Aeroplane Club, and enhanced lately by the visit of H.R.H. the Prince of Wales in the Vickers "Vista" (2 Pegasus). The enforced stay of the Mollisons has also had a great effect, and brought aviation into prominence, many thousands of visitors having journeyed to the Municipal Airport, to view the *Seafarer*, which was kindly loaned to the Club for exhibition. In addition, Cardiff is somewhat exceptional as a provincial Municipal aerodrome in having two scheduled air lines operating, using Cardiff as a junction—the G.W.R. line, which now runs from Birmingham to Plymouth, via Cardiff and Teignmouth, and the Bristol-Cardiff air ferry, which has now accomplished some 35,000 miles in twice-daily trips. It is not surprising, therefore, that approximately 25,000 people turned up on July 22 for the annual pageant organised by the Cardiff Aeroplane Club, and were treated to an exceptionally attractive and well-organised display, favoured with magnificent weather. In spite of the depression, the usual Cardiff exhibition of fine cars and fashionable gowns was much in evidence. The Rt. Hon. Sir Philip Sassoon, Under-Secretary of State for Air, declared the meeting open, having flown from Hendon in a Hawker "Hart" (R.R. Kestrel), with an escort of three machines. His speech was carried to every corner of the aerodrome through the loud speakers, and he emphasised the merit of co-operation between the civic authorities and club promoters, visualising a day not long distant when flying enterprise, which had commenced so well in Cardiff, would play an important

part in the restoration of economic prosperity in South Wales. Sir Philip was introduced by Mr. C. Temple Morris, M.P., who is an enthusiastic member of the Cardiff Club, and in whose constituency the pageant was held.

The first event was the arrival of the competitors in the Annual London (Heston) to Cardiff Air Race, which again proved its popularity by attracting a good entry in spite of the other meetings scheduled for the same day. It will be seen, from the table below, the field comprised a good



(Left to right) Sir Philip Sassoon; Mr. J. A. Sandbrook, Editor-in-Chief, *Western Mail and South Wales News*; Mr. A. J. Styran; Mr. A. Henshaw; Mr. Norman Edgar and "An Other." Mr. Styran was the winner of the Heston-Cardiff race for the *Western Mail* Trophy.



Mr. A. J. Styran flying Sir Derwent Hall-Caine's "Leopard Moth" ("Gipsy Major") in which he won the Heston-Cardiff race on Saturday, July 22. (FLIGHT Photo.)

mixture of aircraft types, with many good hands (and feet) to steer them.

As the competitors assembled at Heston so the day grew hotter and the vagaries of the wind in strength and direction increased. In fact, when the time came for the race to start, it became necessary to decide on a wind direction in order to maintain a constant position for the starting line. An after-luncheon siesta on the part of the well-known Heston wind indicator played its part in this connection.

The inspection of the competing aircraft passed without incident other than the necessity to inspect Mr. K. E. Lloyd's Parnall "Elf" in the repair shop. An under-carriage fitting had come to grief during the previous evening, and whilst mechanics worked hard to prepare for replacing the fittings, so new fittings were being rushed up by air from Yate. Until the very last moment it seemed hopeful that the "Elf" would be a starter, but in spite of every effort it could not quite make it, the starting time of the race being governed by the need for the finish at Cardiff to be at 3.30 p.m. in order to fit in with the remainder of the programme at that end. As it was, and in spite of the "ubiquitousness" of Miss "Susan" Slade in her efforts to drag some of the competitors from their luncheons, the start was 5 min. late; otherwise, all went according to plan.

The handicapping by Capt. Dancy was as effective as last year, and a really thrilling finish was witnessed by the crowd, Sir Derwent Hall Caine's "Leopard Moth," piloted by A. J. Styran, being first over the line, followed in quick succession by A. Henshaw on the Comper "Swift" with which he won the Siddeley Trophy in the King's Cup, and Norman Edgar in the "Puss Moth" entered by Mr. Richard Cadman, of the Cardiff Aeroplane Club. Mr. Percival, Lady Bailey and Mr. A. H. Cook were all within a few seconds of each other, providing excellent testimony to the skill of the handicapper. Col. L. Strange, who was the first man away, told us that the handicapping was so good that he was not overtaken until after Newport, when he could see the finishing line, and then all the machines came past him in a bunch.

THE ANNUAL LONDON (HESTON)—CARDIFF RACE

Pilot	Aircraft and Engine	Starting Time	Finishing Time	Av. Speed	Place
L. Strange ..	"Clipper" (Pobjoy R)	h. m. s. 14 22 44	h. m. s. 15 38 22	m.p.h. 95½	8
P. Hough ..	"Moth" (Gipsy II)	14 25 50	15 36 31	101½	6
Sir Derwent Hall-Caine	"Moth" (Gipsy II)	14 25 50	15 38 49	98½	9
A. Cook ..	"Swift" (Pobjoy R)	14 34 44	15 37 44	114½	7
Norman Edgar	"Puss Moth" (Gipsy III)	14 36 40	15 35 33	122½	Third
A. Henshaw ..	"Swift" (Pobjoy R)	14 37 08	15 34 53	124½	Second
Lady Bailey ..	"Puss Moth" (Gipsy Major)	14 38 55	15 36 19	125½	5
A. Styran ..	"Leopard Moth" (Gipsy Major)	14 41 36	15 34 14*	136½	First
E. Percival ..	"Gull" (Javelin IA)	14 47 59	15 36 10	149½	4

(* Estimated Finishing Time—15h. 34m '44s.)

Sir Derwent Hall Caine's "Leopard Moth" was quite a centre of attraction, after its success in the King's Cup, and this was the first occasion on which the new D.H. production has been seen in the West. Capt. Cyril Uwins, who has been a regular performer at Cardiff since the inception of the Club, gave his usual polished exhibition on

the Bristol "Bulldog." His climbing slow rolls are still a joy to watch. Strictly to schedule time, No. 501 (Bomber) Squadron from Filton, Westland "Wallaces" ("Pegasus"), flew over the aerodrome under the command of Sqd. Ldr. W. Elliott, and gave a perfect example of Royal Air Force training and discipline. At Bristol in June, even in a very high wind, the formation was beyond criticism, but on Saturday the squadron certainly excelled itself, calling for much enthusiastic comment. The crazy flying of Mr. H. B. Field in an Avro was of a very high order, and Capt. "Wingy" Wyndham and Mr. G. de Greeuw furnished some very spectacular parachute jumps. The delayed drop of the former was the first event of this nature seen in Wales, and tremendous excitement prevailed as the parachutist dropped for some 2,000 ft. before opening, landing in the middle of one of the enclosures, without, however, inflicting any damage. About 50 machines attended the meeting, and it was somewhat unfortunate that the date clashed with two other important events. The organisers, however, have every reason to be satisfied, as every item went off without a hitch, and to schedule time. Joyriding took place until a late hour, and the Lord Mayor of Cardiff (Alderman C. F. Sanders) and the Lady Mayoress (Miss M. Muriel Sanders) took flights. The Corporation was represented by Sir Iltyd Thomas (Chairman, Aerodrome Committee), the Town Clerk, Mr. D. Kenwyn Rees, Councillor George Williams, Councillor A. E. Shippobotham, Mr. William Forbes, whilst visitors included Mr. O. Temple Morris, M.P., and Mrs. Morris, Mr. Tom Griffiths, M.P., Dr. G. Arbour Stephens, Mr. Robert J. Webber, Managing Director of the *Western Mail*, and Mr. J. A. Sandbrook, Editor-in-Chief of the *Western Mail*. The Cardiff Club have reason to be especially grateful to the *Western Mail* for the Flying Scholarship scheme recently inaugurated by that journal. On an occasion when team work alone is responsible for such success, it is difficult to single out individuals, but special mention must be made of the work of the Chairman, Capt. W. R. Bailey, and Secretary, Mr. Arthur Davies. Mr. Evan Roberts handled the publicity extremely well, and Mr. Norman Nash was responsible for control of the crowd and layout of the aerodrome arrangements. Councillor O. C. Purnell was his usual bright self on the announcing, assisted by Mr. C. H. Phillips. Cardiff hospitality is proverbial amongst the flying fraternity, and Saturday's event was exceptional, even for Cardiff, in this respect. Mr. Charles Keen and Mrs. Keen, together with Mr. Kenneth Davies and Mrs. Davies and Mrs. Bailey, entertained all the guests to dinner and dance at the Angel Hotel, the party afterwards migrating to the latest Welsh inspiration, "The Blue Horizon"—a charming old mansion converted into a very entertaining country club—where dancing and bathing kept the entertainment going until an early hour.

MAIDSTONE AIRPORT OPENED

MAIDSTONE Airport and Aero Club were officially opened on Saturday, July 22, on the occasion of a Garden Party at the Airport. The opening ceremony was performed by Sqd. Ldr. the Marquis of Douglas and Clydesdale, who arrived in his "Moth" ("Gipsy III"). He was welcomed by Sir Robert Gower, who reminded those present of the fine

work the Marquis had done for aviation, both in connection with the flight over Mount Everest and by his work in the House of Commons.

The Marquis, in his opening speech, said that Great Britain must set a lead in aviation, the same as she had on the sea, and the best way to attain this end was to establish good landing grounds with petrol supplies all over the country. Maidstone had gone further than this in the equipment of its airport, and he asked for support for the Maidstone Aero Club. It had been suggested, he said, that he should crash an aeroplane in the middle of the aerodrome, as an opening ceremony, but by cutting a tape he used a less expensive and exacting method.

The Deputy-Mayor of Rochester, after proposing a vote of thanks to the Marquis, said that Rochester intended to build an aerodrome, as the firm of Short Bros. had made the town air-minded. Count Johnston-Noad seconded the vote of thanks, and called for three hearty cheers for the Marquis.

Messrs. Andrews and Wiltshire, whose yellow Spartan three-seater ("Hermes II") is now a familiar sight at many flying meetings, "set the ball rolling" by showing some of the local inhabitants the beauties of the neighbourhood from the air.

Three Vickers "Virginias" (two Napier "Lions") of No 500 (B.) Squadron, stationed at Manston, flew low over the aerodrome in close formation. Their size, and the booming of the "Lions," obviously impressed the crowd greatly. Also from Manston came two Hawker "Audaxes" (R.R. "Kestrel I.B.") of No. 2 (A.C.) Squadron, flown by F/O's Murphy and Dixon-Wright. Although No. 2 Squadron has had the "Audax" only about two months, the wide speed range and controllability of this type was well demonstrated when one of the machines flew past at about 65 m.p.h. and came back at about 160.

Mr. F. George, using a British Russell Lobe parachute, made a jump from the Club's "Moth" ("Gipsy I") flown by F/O. L. H. Snelling. He jumped over the S.W. corner of the airport and landed on the N.W. side. F/O. Snelling later gave a very neat and well-placed aerobatic display on the "Moth." The same machine was later saved from serious damage by Mr. Joice-Clarke, the Club's ground engineer. The machine started to run forward when the engine was started, but Mr. Joice-Clarke, by hanging on to a wing, slewed the machine through two or three revolutions until it stood on its nose. The only damage was a smashed airscrew.

In the evening, after the visiting machines had left, a very cheery dance was held in the tastefully decorated club-house.

With reference to the All-Women's Air Rally, which was to be held on Saturday, August 5, it has been decided to make this event of an international character, owing to unexpected support from the Continent. The meeting will be held on August 4 of next year. The Club are now accepting applications for membership at the half-yearly subscription of £1 11s. 6d. On Sunday, August 6, the monthly At Home will be held, and there will be dancing every evening throughout the season.

HANWORTH (N.F.S.)

Club flying for the past week amounted to 121 hr. Cross-country flights included Mr. Leslie Fuller, from Hanworth to Manston and return each day; Mr. A. P. Whitelaw, to Eastbourne and Shoreham; Mr. Naish, to Birmingham; Mr. Back, to Cowes; Maj. Osmaston, to Blackpool; Mr. Musker, to the Isle of Wight, and Capt. Findlay, from Beckhampton to Liverpool and return with Mr. Fred Darling. The Master of Sempill, on Saturday, July 15, flew to the Lizard, the Isle of Man, and Fintry, near Aberdeen, arriving back at Hanworth after dark on Wednesday, July 19, having flown some 17 hr. First solos included Mr. C. Fuller and Herr Mertz; the latter has also carried out "A" licence tests. Mr. R. Badhe has been doing cross-country dual for his "B" licence, and Mr. Sandys, who has purchased a new "Moth," has also received dual instruction. Mr. R. Bentley has been to Scotland in his Comper "Swift," Mr. Gutterman left for Germany in his Klemm, M. Georg Hanet arrived from Belgium, and Lady Hay Drummond-Hay in the Waco. Mr. Leslie Fuller still continues his daily taxi flights with Capt. Findlay. On Tuesday, July 18, he was in London at 6 p.m., took part in a show at 8 p.m. at Margate, and then flew on to Shoreham, arriving there about 10.30 p.m. to be present at the opening of a new cinema at Hove.

Inca Aviation have started operations with their aerial advertising. The workshops are very busy fitting their special wheel-spats to new machines and turning out the new spring-loaded aerodrome marking flags.

YORKSHIRE AEROPLANE CLUB

During the past week about 28 hr. have been flown on club machines, indifferent weather having been very much a handicap. The Club gained second and third place in the Yorkshire Trophy Air Race from Heston to Sherburn on Sunday, July 16, the pilots being Capt. H. V. Worrall and F/O. B. E. Moody, both flying Arrow "Actives." A new flying member is Mr. R. H. Spurrier, of Horsforth, Leeds, and up to date 24 candidates have taken tests at Yeaton under the rules of the *Daily Express* Flying Scholarship scheme. Mr. G. H. Ambler, a private owner, has been night-flying recently on his "Monospar," and Mr. R. E. Beanlands flew to Scarborough aerodrome at Ganton.

SURREY AERO CLUB

The last month has seen a boom in flying, new members taking "A" licences being Capt. Porritt, Mrs. Willing, Messrs. C. Hart and Ferriss. New members include Lord Borowdale, Capt. and Mrs. Noakes, Mr. and Mrs. Price, Col. Cowell and Mr. Nicholls. Mrs. Macdonald has ordered a Miles "Hawk" which she will fly out to Iraq at the end of September. A treasure hunt is being organised for Saturday, July 29, and will start from the club-house at 7.30 p.m. The entrance fee is 5s., which will include bathing by floodlight, dancing and supper at the winning post. An open Clay Target Shoot is being arranged for Saturday, August 5, and it is hoped to arrange a shoot for Owners, Trainers and Jockeys on September 8, when teams will shoot for a cup presented by Mr. Meyrick Good, one of the members of the Club.

FLYING BUSMEN: The London General Omnibus Co. Flying Club held an air display at the aerodrome at Abridge, Essex, on July 23. Here we see a group of busmen pilots, trained by the Club, who have flown solo—(left to right) Mr. Hall (Ground Engineer); Driver Tucker; Driver Binder; Conductor Burton; D. Kinnear (Instructor); Driver Wheadon and Conductor Hicks.



LONDON AEROPLANE CLUB

The move to Hatfield is due to take place at the beginning of September. Mr. T. C. Place has passed his night-flying tests for a "B" licence and Mr. H. Goddard has completed his "A" licence tests. Messrs. A. J. Baker, A. Pigou, and C. Goldsmith have done first solos. The Club are pleased to welcome Col. Farfan, who has returned from India after an absence of two years, and a new member, Capt. Holland. Miss Scott has begun a course in the hangar and Mr. Stenham is starting his on Monday. Mr. L. Lipton has just bought *The Heart's Content*, which is the second of the Mollison machines which has come into his possession.

BROOKLANDS

The flying times for the week totalled 80 hr.—55 solo and 25 dual. New pupils include Lady Hoare, Messrs. Colman and Vokes. Mr. Stevens has done cross-country flight to Leeds, Yeovil and Castle Bromwich, and Mr. Winslett has done his height test and completed his hours for an "A" licence. Several members flew down to Lympne for the week-end International Air Rally. An Autogiro party was held on Sunday, July 16, several members making trial flights. Brooklands Airways have been doing work in connection with the films, and have also been to the Channel Isles and Le Touquet.

LANCASHIRE'S NEW BABY

We are informed that the Lancashire Aero Club and the Manchester Aero Club have come to an agreement whereby the latter will in future be administered by the former. Whether or not the name will be changed to Lancashire Aero Club has not yet been announced.

SKEGNESS AND EAST LINCOLNSHIRE AERO CLUB

Joy riding is now in full swing at Skegness, both the "Fox Moth" and "Puss Moth" being kept busy. A "Gipsy Moth" has been added to the school machines and has already put in a lot of work. Mr. Mitchell and Mr. Munks have passed tests for "A" licences, and Mr. Townsend is rapidly completing the time necessary for a "B" licence. Mr. Henshaw, a club-trained pupil, won the Siddeley Trophy on his stream-lined Comper "Swift," which he now owns in addition to a "Gipsy Moth." Mr. Henshaw only learned to fly last year, and is to be congratulated on his performance. Both he and Mr. Scott competed in the Yorkshire Trophy, and the former gained second place in the short-distance race. Various taxi flights have been carried out, including one to the Isle of Wight by Mr. Hill in bad weather. The Nottingham service is now running daily to and from Skegness.

STAGE AND SCREEN AERO CLUB

Members of the Stage and Screen Aero Club are, together with help from several well-known local people, organising a mounted gymkhana, fair and theatrical garden party to be held at Hatfield on Friday, September 29. On the lighter side, one of the chief events will be a "Grand Giggle," in which Mrs. Douglas Cory-Wright and Sir Gerald Du Maurier will take the leading parts. The Club is already doing a considerable amount of flying at Hatfield, where it keeps a "Moth."

ORGANISERS FOR THE S. & S. AERO CLUB: Left to right front, Pat Hollander, Lady Du Maurier, Miss Dorothy Hyson, Hon. Mrs. Faulconer, Miss Joyce Kennedy, Mrs. Douglas Cory-Wright. At the back, Mr. A. J. Austin, Sir Gerald Du Maurier, Mr. R. Douglas, Mr. J. Raglan. (Flight Photo.)



LEICESTERSHIRE AERO CLUB

The club aerodrome is to be closed from August 4 to 18, and it has been decided to take the club machines for an aerial tour of Great Britain lasting four days. The pilots will be Messrs. R. C. Winn, S. Brown and J. T. L. Baxter, and the following itinerary has been suggested: on Sunday, August 6, Desford to Brooklands, and to Norwich; on Monday, August 7, Norwich to Skegness, to Brough and to Scarborough; on Tuesday, August 8, to Cramlington and Renfrew, and on Wednesday, August 9, to Blackpool, and return to Desford, a total distance of 860 miles.

ETON FLYING CLUB

Steps have been taken to form an Old Etonian Flying Club—the first public school flying club in the country. The object of the Club is to provide cheap flying for Old Etonians, who desire to learn, and also to establish a headquarters where Old Etonians can meet. The matter has been put before the Vice-Provost, who has given his assurance that it will receive the careful consideration of the Provost and Fellows of the College when the time arrives.

SOUTHEND FLYING CLUB

The Club's machines have been very busy at the Rochford aerodrome, between showers, during the week ending July 16. Several trips were made to Maidstone and Gravesend, and on Sunday, July 16, the "Spartan," piloted by Mr. Roper Brown, took two passengers to visit Croydon airport. During the afternoon a D.H. "Dragon," of Hillman's Airways, landed at the aerodrome with a party of visitors to Southend; although this type of machine can be seen flying over the town every day, it attracted quite a lot of interest.

Saturday, July 22, was a quiet day at the Rochford aerodrome, several of the members being away on visits to the flying meetings at Hatfield and Maidstone. Capt. Mackintosh came in over the week-end with the "Moth" which Mr. C. W. A. Scott flew to Australia and back, and which is taking part in the Hospitals Pageant. Other visiting airmen on Sunday were Mr. A. Henshaw in his Comper "Swift" with which he won the Siddeley Trophy in the King's Cup Race, and Mr. Lipton, of the London Aeroplane Club, another King's Cup competitor, who arrived to spend the week-end at Southend in his "Gipsy Moth" *Jason 4*, recently owned by Mrs. Mollison. Mr. Nicholson, who is learning to fly before he returns to Burma, did his first solo flight during the week.

NORTHAMPTONSHIRE AERO CLUB

Last Saturday the Club was well attended to bid Mr. Thorn farewell on his departure to Brooklands. Flt. Lt. R. L. Palmer arrived the same evening from

Achievement

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LONG-DISTANCE FLIGHT

Fairey-Napier Long Range Monoplane.
5,340 miles. Non-stop. 8th February, 1933.

AIR SPEED RECORD

Macchi Fiat Seaplane. 423 m.p.h.
10th April, 1933.

SCHNEIDER TROPHY

Supermarine Rolls - Royce Seaplane.
340.08 m.p.h. September, 1931.

KING'S CUP RACE

1st. Capt. Geoffrey de Havilland. Leopard Moth. 139.51 m.p.h.
2nd. Flight Lieut. E. C. T. Edwards. Comper Swift. 126.89 m.p.h.

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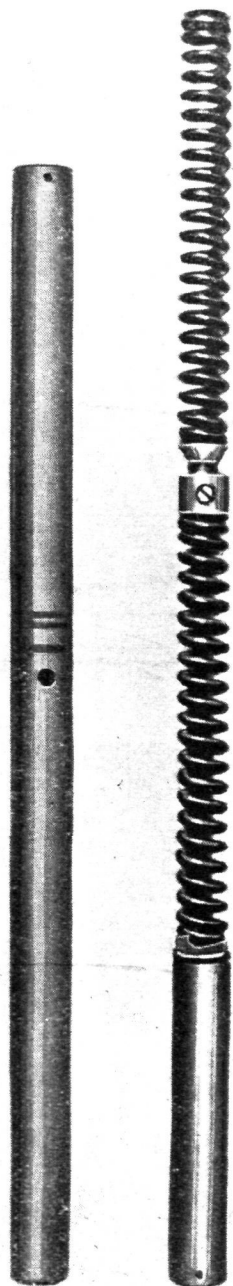
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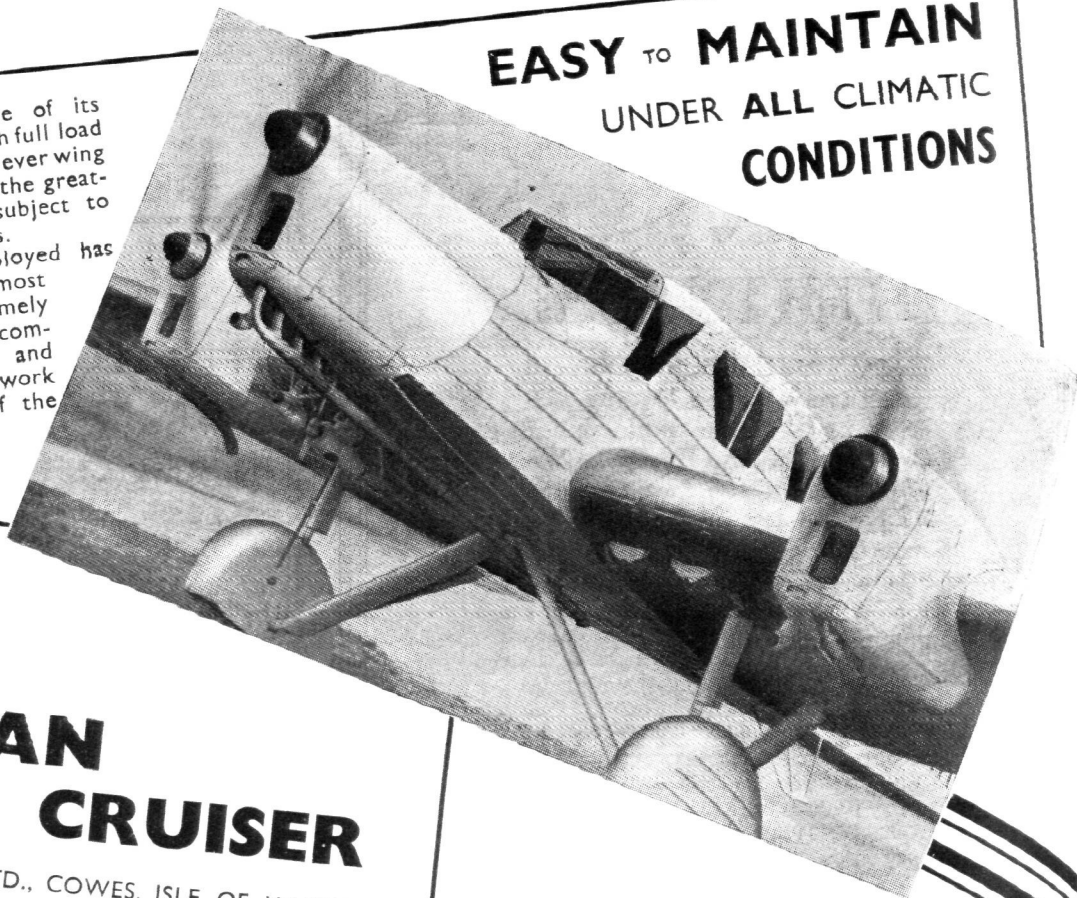
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Brooklands and was welcomed by the Vice-Chairman, Capt. G. R. D. Shaw, and other members present. Mrs. E. Longsdon has returned to renew her "A" licence after an absence of several months, and Mr. R. A. Boswell has successfully passed his height test for an "A" licence.

BRISTOL AND WESSEX AEROPLANE CLUB, LTD.

Five new pupils have begun training since the beginning of July, making a total of sixteen members at present under instruction at Bristol. Messrs. E. C. W. Voke and A. G. Neale have completed "A" licence tests and Mr. H. R. Wheeler made his first solo flight during the week. On Sunday morning three of the Club machines paid a visit to the Southampton Municipal Aerodrome, the pilots and passengers being hospitably entertained to breakfast by the members of the Hampshire Aeroplane Club.

The Club Garden Party, to be held at the Bristol Airport on September 16, will again be an informal affair. There is to be a series of flying competitions, for which suitable prizes will be awarded, and a dance in the evening. On the Sunday golf, tennis and squash rackets matches will be played between teams representing the Bristol and Wessex Aeroplane Club and teams representing flying organisations from other parts of the country.

On Saturday, July 22, a strong contingent from Bristol visited the Cardiff Municipal Aerodrome to support the Cardiff Club's Flying Meeting, a total of eight machines making the journey from Bristol Airport to Cardiff.

Bristol Club flying hours are showing a very satisfactory increase up to July, when compared with the hours for the same period last year.

THE RAND FLYING CLUB

The Rand Flying Club was enthusiastically inaugurated at a well-attended meeting on Saturday, July 1, presided over by the Mayor of Johannesburg, Mr. B. C. Vickers, at the Carlton Hotel. The Mayor said that he hoped the Club would enhance the popularity of the air-

port, which up to then had been almost entirely taken up with the commercial side of Aviation. It had not been formed with any intention of attempting to oust its elder brother, the Johannesburg Light Plane Club, they would work together harmoniously towards a common goal. The Mayor looked forward to the time when flying clubs would be as popular as football, tennis, and cricket clubs. The Mayors of Benoni and Germiston, Messrs. T. Newby and N. J. Kock also spoke in support of the Club. Dr. E. L. MacKenzie, Chairman of the Club Committee, outlined the activities of the new Club. In addition to flying, tennis and golf would be available, and the Germiston Lake, scarcely a stone's throw away, would provide boating and bathing.

THE DE HAVILLAND SCHOOL OF FLYING

The flying time for the week ending July 22 was 211 hr. Ben Lyon carried out his tests for his "A" licence during the week. The Stage and Screen Sporting and Aero Club held a combined general meeting and luncheon party on July 22 to discuss the proposed gymkhana and fair to be held on September 29 in aid of the Actors' Orphanage, as reported elsewhere. The opening ceremony of the Royal Air Force Reserve Club was well attended. An excellent display by Air Force pilots and magnificent demonstrations by Flt. Lts. Johnson, Bulman and Staniland were truly appreciated by all. The swimming pool is a great success, the water from the artesian well is delightfully soft and refreshing. 10,000 gallons an hour are available, so the pool is refilled constantly. The Mollisons spent a lazy afternoon swimming and sunbathing, which, as a contrast to the anxious waiting for weather, they seemed to thoroughly enjoy. The *Movietone News* filmed a special item at Hatfield on a first lesson in flying; obviously it had to be abbreviated rather drastically. It is being shown from July 24 to 29 at the News Theatre, Shaftesbury Avenue.

Air Transport

WIRELESS EQUIPMENT FOR AFRICAN AIR ROUTE

IN our issue for March 30 last we referred to experiments carried out in connection with wireless communication on the African air route, which presented certain difficulties. As a result of these experiments it was decided recently that the entire fleet of eight Imperial Airways' "Atalanta" type aircraft for the Indian and African air routes would be fitted with the new Marconi medium- and short-wave apparatus known as the Type A.D.37A./38A.

This decision is by way of a practical tribute to the enterprise of the Marconi Company in carrying out a special wireless survey of the African air route, in co-operation with the Air Ministry and Imperial Airways, Ltd., as soon as it was realised that the normal types of aircraft wireless equipment which provide efficient air-and-ground communication services over the European air routes were not adequate for the African service on account of the frequent and violent electrical storms encountered in the equatorial regions of that Continent. To determine the best means of ensuring efficient wireless operation under these difficult conditions a Marconi engineer carried out an extensive series of tests with long- and short-wave wireless communication from the air over a period of six months, flying over the route in aircraft specially fitted with experimental wireless apparatus. The result was the development of the new equipment, which is capable of communication either on the medium wavelengths usually employed for ground-and-air wireless contact or on short waves, with their freedom from atmospheric disturbances.

Careful experiments carried out under practical working conditions—and since, of course, confirmed in actual service—demonstrated that by means of this combination of two wavebands, 500-1,000 metres and 40-80 metres, it was possible to maintain reliable two-way ground and air communication over the entire air route with a good "safety margin" always in hand.

As an additional refinement a small attachment to the new receiver provides a simple and convenient direction-

finding service of the "homing" type (see *FLIGHT*, May 18, 1933), enabling the pilots to set their course by the ground wireless stations along the route.

The Marconi Type A.D.37A./38A. equipment comprises a combined transmitter and receiver enabling both telephone and telegraph communication to be maintained on both the medium and short wavebands. Adjustment of the apparatus to the wavelength required for reliable communication under any conditions has been reduced to a simple operation, so that transmission and reception can be controlled by the pilot if required.

Special features of the transmitter are the employment of the "independent drive" method of frequency control, and the use of the same valves for both the medium-wave and short-wave circuits. The receiver employs one screen grid high-frequency amplifier, one detector with adjustable reaction coupling, and one low-frequency magnifier. The medium-wave and short-wave ranges are each provided with their own high-frequency amplifier valve, but the detector and low-frequency magnifier valves are common to both wave ranges.

The Marconi directional receiving attachment—as we have already described—consists of a small instrument box containing a special tuner and high-frequency amplifier and a switch box, affixed to the A.D.38A. receiver, and a loop aerial installed round the fuselage of the aircraft.

The performance of this equipment in the four "Atalanta" type aircraft already operating on the African air route has established new records in range and quality of aircraft communication in spite of the difficult electrical conditions prevailing over Africa.

Short-wave communication over distances up to 2,000 miles, from Capetown to M'beya, Tanganyika, are reported consistently. When the emergency equipment for ground working was tested at Capetown on medium waves, using a 12-ft. ladder as a support for the trailing aerial, two-way telegraphic communication was maintained with Victoria West at 380 miles, and the aeroplane's messages



GIVING GOOD SERVICE : This Junkers of Brooklands Airways is one of the hardest worked machines. It is always off abroad or on long journeys to the North. It is not surprising that people like travelling in it as it is one of the most quiet and comfortable cabin aircraft. (FLIGHT Photo.)

were received at Germiston (Johannesburg) at a distance of 830 miles.

A fixed aerial is available for short-wave communication, and it is quite usual to switch on to this aerial and transmit telephony or telegraphy immediately on winding in the trailing aerial. In this way signals are received from the aeroplane while it is still running across the aerodrome after landing. In the case of a forced landing, such means of communication would obviate all anxiety. "Perfect homing" is reported with the direction-finder attachment at distances up to 240 miles.

During a recent flight in an "Atalanta" type aircraft on the Indian air route, the wireless operator reported that with the new equipment he "worked Karachi 900 odd miles on both medium and short waves and Gaza 1,200 miles on long waves; also Heliopolis about 600 miles on short waves."

Brooklands Airways

Few ventures achieve in so short a time the success which has been the lot of Brooklands Airways. Although only starting last February, the management have already built up a clientele which has kept them busy almost every day. The Directors, Capt. H. D. Davis, Mr. W. Ledlie and Mr. F. R. Walker, decided to run their machines at a very low price—for example, a "Puss Moth" only costs 9d. per mile—with the result that they are seldom short of passengers. Naturally, a satisfied customer is something to be sought after, and Brooklands Airways certainly have many of these. On one occasion recently they were asked by a well-known motoring paper to deliver a load of the latest edition in the Isle of Man. It was, however, stipulated that the flight would have to be completed whatever the weather if their contract was to hold—anyone who flies will understand what an exceedingly difficult thing that was to undertake. It did not daunt Mr. Ledlie; he took over the firm's Junkers but found the island completely blotted out under fog, so carried on to Ireland, turned round, and came back again under it, landing within the agreed time. The firm are constantly sending their machines to the Channel Islands and to the Continent, while they have also recently done a certain amount of work for the film industry, when Ben Lyon had to be filmed flying in a Junkers. It goes without saying that the firm's aircraft are all fitted for night flying, and that a ring to Byfleet 436 will ensure a machine being ready at any time. At present Mr. Ledlie is the only pilot employed on full time, but arrangements have been made with Brooklands Aviation whereby aircraft or pilots can be made available as required.

The Napier "Javelin"

WE learn that D. Napier & Son, Ltd., are supplying two of their 160-h.p. "Javelin" six-cylinder inverted air-cooled engines to a foreign constructor who is building a machine to compete in the England-Melbourne Race next year.

The Douglas-Pennant Case

IN reply to questions concerning the case of the Hon. Violet Douglas-Pennant, Mr. Baldwin stated in the House of Commons that the case had been exhaustively considered and a copy of the letter, which was addressed on

An Unsubsidised Italian Air Line

ON July 1 the S.A.M. Co. (Stà Aerea Mediterranea) opened the first unsubsidised air line in Italy, connecting Rome with Aquila, Chieti and Pescara. This is a tourist service to the Abruzzi district, and will be operated as follows—from July 1 to August 7 and August 19 to September 15, departures from Rome (Littorio) on Tuesdays, Thursdays and Saturdays; from August 7 to 19, departures daily. The Rome-Pescara service takes 1 hr. 45 min.

Guinea Airways in Fiji

SPEAKING at the last annual meeting of Guinea Airways, Ltd., the Chairman, Mr. C. V. T. Wells, referring to the fall in the gross profit, pointed out that considerable reductions had been made in the freight rates, though a larger amount of tonnage had been handled, and economies which had been effected did not take effect until the end of the year, so that their full saving had not been reflected in the accounts. They had, he added, started a new seaplane service in Fiji under the management of their former chief pilot, Mr. A. S. Cross. This service, which is confined to the Fijian Islands, has made a successful beginning.

Portsmouth and Isle of Wight Services

THE following numbers of passengers were carried during the week ending July 20 on the services operated by the Portsmouth, Southsea & Isle of Wight Aviation, Ltd.:—Spithead Air Ferry, Ryde and Portsmouth (270); Shoreham Air Ferry, Portsmouth and Shoreham (5); Shoreham Air Ferry, Shoreham and Isle of Wight (2); Shanklin Air Ferry, Portsmouth and Shanklin (27); Shanklin Air Ferry, Ryde and Shanklin (2).

Spartan Air Lines Progress

RUNNING between Cowes (Isle of Wight) and Heston (London), Spartan Air Lines have already worked up a good passenger average, although they only started operations on April 12 this year. They are getting a steadily increasing number of passengers and for some time now have carried over 70 per week. Another branch of their business which has grown with leaps and bounds is their special charter department. They are doing a large number of trips to the Continent, particularly for people who like to take their whole party together. People who like to have their English newspapers while in Ostende are also benefiting from Spartan Air Lines, as the company has secured a contract to deliver English papers there daily. They leave Croydon at 4.30 a.m. every morning for the purpose.

the Prime Minister's instructions to the Chairman of the Douglas-Pennant Committee on June 3, would be forwarded to the interrogators.

Viva Voce

SIMILARITY of voices must be taken as our excuse for crediting Mr. Alan Goodfellow with doing the broadcasting during the King's Cup Race at Hatfield. Actually the clear tones we heard coming from the loud speakers were originated by Mr. Ivor McClure, who runs the Aviation Department of the Automobile Association with such conspicuous success. Anyway, they are both good fellows!

Airport News

CROYDON

ON Monday, July 17, Sir Flinders Petrie, the 80-year-old archaeologist, accompanied by his wife, made his first flight—from Croydon to Le Touquet and back—in the Imperial Airways liner *Horatius*. Sir Flinders was so enthusiastic about it that he has decided to travel to Palestine every year by air in future. "Travelling by air is delightful," he said, "it's better than a camel, steadier than a train, and smoother than a ship."

The Imperial Airways liner *Heracles* arrived at Croydon on Monday carrying half-a-ton of air mail and nine passengers, having flown from Calcutta, a distance of 6,500 miles in only six days. This is the first regular air mail to reach London from Calcutta.

Mr. Franklin Roosevelt, son of the President of the United States, arrived at Croydon in the air liner *Hengist* from Paris on Wednesday. He was accompanied by two friends, and was met at the aerodrome by a member of the American Embassy. He said that he would be staying in England for about ten days, and he hoped to make a couple of trips into the country.

Learning that it was necessary for her to sail for America at once, a woman left Paris at 3.30 in the Imperial Airways liner *Hengist* on Thursday, arriving at Croydon fifteen minutes ahead of scheduled time. She was then rushed by car to Waterloo, where she caught the boat train at 6.30, and by 8.30 was on board a boat bound for America.

Lady Willington, wife of the Viceroy of India, left Croydon at 3.30 on Saturday afternoon in the Imperial Airways liner *Heracles* for Paris. Lady Willington, who is returning to India, was met at the airport by a large number of friends and the prominent persons of the Indian colony in London. Just before she stepped into the machine Lady Willington was presented with a wreath of various-coloured marigolds, which is a symbol of great distinction in India. She was accompanied by her son, Lord Raten-done, and Capt. Beatty, aide-de-camp to the Viceroy. Amongst the many present to wish Lady Willington *bon voyage* were the Maharajah of Bharatpur, of the United Provinces, and his friend the Nawabzada of Junagudh, who are at school together at Bexhill. They are two of the wealthiest boys in the world.

The total number of passengers for the week was 2,509. Freight, 83 tons 13 cwt. HORATIUS.

AIRWORK AT PLAY

MR. AND MRS. NIGEL NORMAN and Mr. Alan Muntz request the pleasure of the company of — at Heston Airport on Wednesday, July 19, at 6 p.m., for flying and cocktails."

Quite an original idea, and quite an effective one. We don't know how many people were asked, but of the large number who went few, if any, can have gone away without having gained a closer and better knowledge of aviation and of aircraft. It was definitely one of the "better" parties. Miss Slade, who looks after the commissariat, excelled herself by providing a greater variety of delicacies than ever seen before, even at Heston, while with the collaboration of many well-known pilots there was, gathered together on the aerodrome, an almost equally varied assortment of aircraft.

All the guests were invited to take flights, and keen officials urged them towards the machines of their choice. One cheerfully asked a passenger if he liked his *baptême de l'air*. Wing Com. Probyn assured him that he enjoyed it very much! Nevertheless it did warm one's heart to see enthusiasm of that kind. One guest asked us what the letters on the aeroplanes meant; we enlightened him, but felt sorely tempted to point out that the new "Monospar" was distinctly academical with its ACGI, while a well-known "Moth" might, to judge by its occupants as well as by its fondness for the letter A, justifiably have been called Alan's (or Alfred's) Aviation Assurance Ambulance.

Flt. Lt. W. E. P. Johnson and Mr. N. Tangye provided a pleasant contrast to joy-riding by throwing a couple of Comper "Swift's" ("Pobjoy") about. Theirs is a dual show of which more will be seen at subsequent meetings this year. Flt. Lt. N. Comper himself also flew a "Swift," but one with a "Gipsy Major" engine, so his climb and top speed were distinctly spectacular.

Airwork, that is the whole staff, not only at Heston, but also in Egypt and Baghdad, have, under the able leadership of Messrs. Norman and Muntz, shown in no uncertain manner that commercial aviation can be made a successful business. The foresight they have displayed in launching out abroad and in this country have proved this, so we are glad to learn that their labours are being rewarded. As FLIGHT was able to announce last week, they have received a contract from the Southern Railway which will take some six months to complete, and now we hear that through Misr-Airwork, A. V. Roe's have received an order from Egypt for ten Avro 626 aircraft. These will be three-seater reconnaissance machines for coast patrol, air survey and co-operation work. With Armstrong-Siddeley "Cheetah" engines, they will have a good performance and should be able adequately to patrol large areas in a very economical manner. They will have short wave radio.

Messrs. Norman, Muntz and Dawbarn make a pretty shrewd triumvirate, able to tackle any problems in connection with the establishment of anything appertaining to air operations, so we hope that their "party" on Wednesday was the means of bringing their firm to the notice of a whole host of people who will not only be wanting to learn to fly and to buy aircraft, but who will also want to lay down their own aerodromes and to allow those aerodromes to be used by private owners when they are finished. The one improvement we should like to see at Heston is the transference of the purely club and instructional flying to somewhere else, that would leave Heston freer as an airport pure and simple.

Mr. Weedon, private charter pilot to Airwork at Manchester, made a quick flight to Aldergrove, Belfast, on July 17, when he left Heston at 3.5 p.m. and returned via Manchester at 9.30—725 miles in 6 hr. 25 min. The flight was carried out in Mr. Loel Guinness' Napier "Gull."

On July 21, Mr. Ulm carried out the wireless and petrol consumption tests on his aeroplane, the *Faith in Australia*, after her Heston overhaul. The results of these were highly satisfactory.

During the first six months of this year, the Airwork Service Department have carried out 38 renewals of Certificates of Airworthiness.

On Wednesday evening, July 19, Prince Henry, the Duke of Gloucester, gave his equerry, Capt. Brooke, a great send-off on a flying honeymoon after his marriage to Miss Gretton. The Prince took a number of pictures with his cine-camera of the wedding party leaving in Mr. Jackaman's "Monospar," and afterwards in the air, when he escorted them towards the coast in a machine piloted by Capt. Birkett. On Thursday, Mr. Jackaman conveyed another wedding party to the Continent—Lady Diana Wellesley and Mr. D. Dixon, who flew to Paris for their honeymoon.

Swansea Airport Proposals

SWANSEA are considering appointing a firm to act in an advisory capacity and seek out a site for a landing ground. At a meeting of the Swansea Corporation Finance Committee, opinions were expressed that there are 22 municipalities now who have made provisions for landing grounds and aerodromes, and Swansea could not afford to be left out. Cardiff was quoted as an example of how an airport could be an excellent advertisement for a town. For the present, however, it has been decided not to spend money on the project.

Bideford Aerodrome

THE Air Ministry have been approached by the Bideford Town Council regarding a site for an aerodrome. Three consultants have been approached to give quotations for carrying out a survey of a site.

THE AIR EXERCISES

The Last Three Days

THE report of the Air Exercises in our last issue covered the operations of Monday evening, July 17, the following night, and Tuesday morning, the 18th. The Exercises continued up to 9 a.m. on Thursday, the 20th, when Air Marshal Sir Robert Brooke-Popham ordered the operations to cease. The bad weather which curtailed the night operations on the first two nights gave way, and from Tuesday morning onwards the weather was extremely fine.

Tuesday Evening.—The weather was fine with a light south-westerly breeze and skies only partially obscured by cloud. Nine day-bomber squadrons made raids. They were reported promptly and accurately by the Observers' Corps, and Air Vice-Marshal Bowhill was able to order up fighter squadrons from appropriate aerodromes to meet them. Two "Hart" squadrons, Nos. 18 and 57, worked together as a wing in an attack on Cardington. Eight of the raids were intercepted on the way in and six on their way out. The "Hart" wing was attacked on its way in by No. 1 F.S. ("Furies") and on its way out by both No. 1 and No. 43 F.S. (both "Furies"). Each interception was by a complete squadron of nine fighters.

Tuesday Night.—As night came on Air Vice-Marshal Sir T. Webb-Bowen sent up his night bombers one by one, and at one time there were 40 of them in the air at the same time. In Northland the "Bulldogs" also went up on patrol one by one. It should be noted that "Bulldogs" only are used for fighting at night. The searchlights did good work, and they picked up most of the raiders in the area between Fleet and Woking. Whenever the beams caught a bomber, the nearest patrolling "Bulldog" would come up to investigate, and 30 contacts with the enemy were reported. When a night bomber is caught in the beams of a searchlight, its crew are blinded by the glare, and as the "Bulldog" attacks from out of the darkness, all the odds should be on the fighter.

At 1 a.m. the mist began to roll in rapidly from the coast. Tangmere aerodrome was soon covered by it, and it was realised that before long the aerodromes on Salisbury Plain would soon become invisible. Some of the bombers nevertheless reached their objectives, but then both A.O.C.'s sent wireless orders to recall their machines. Some of the night bombers had to land at Abingdon and Henlow, in enemy territory, but it is not reported that they were made prisoners of war.

Wednesday Morning.—The fog persisted up to 7 a.m., and so the day bombers lost three hours of daylight before they could begin operations. Seven squadrons made raids, concentrating their attentions on four targets, Wantage, Bicester, Hatfield, and Wittering. Three of the raids were intercepted on the way in and four on the way out.

Wednesday Evening.—In these Exercises there is always an armistice from 9 a.m. to 6 p.m. This rests the personnel who are taking part, and also perhaps avoids making too much impression on the minds of the public. Air Vice-Marshal Sir T. Webb-Bowen decided that evening to elaborate the tactics of wing raids, which had previously been tried on Tuesday evening. He sent in one raid by two "Gordon" squadrons, Nos. 35 and 40 B.S., and one by three "Hart" squadrons, Nos. 12, 18 and 57 B.S. In each case the wing kept together while forcing their way into Northland territory, and when near the objectives the squadrons separated and each attacked its

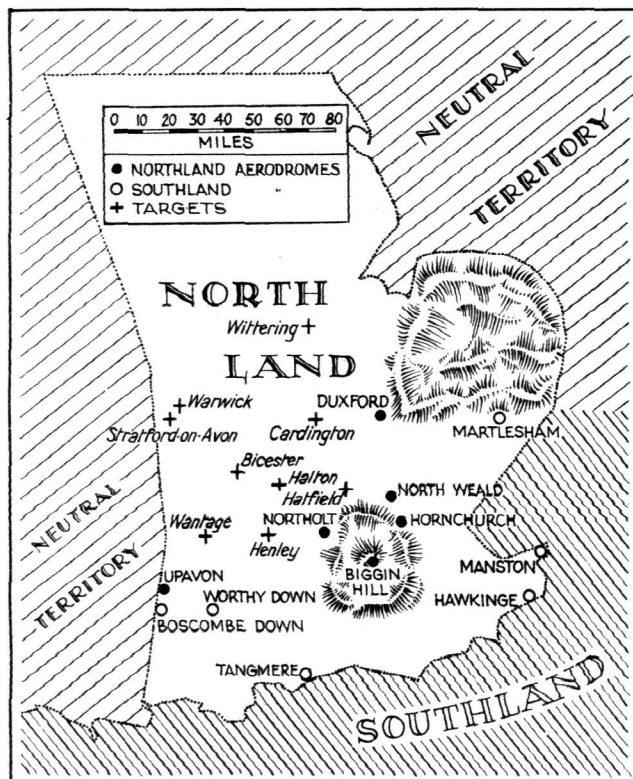
own target. Presumably the idea was to give fighting strength to the raiders until they were near their objectives, at the cost of making detection easier through the size of the formation and the noise of 18 engines. In the case of the "Hart" wing, these anticipations were not realised, for the wing was not intercepted on its way in, though two of the squadrons were attacked on the return journey. No. 12 B.S. got in and out unscathed. The three squadrons were unable to form wing again after dropping their bombs, which was a point scored by the defence. Both the "Gordon" squadrons were intercepted

on the way in, though the report does not state whether that was before they separated or afterwards.

Another plan was tried with the two Scottish Auxiliary squadrons. They both came in by single flights, with the intention of forming squadrons over Farnham. It can be imagined that reports of six raids where only two squadrons were involved would be likely to distract the defence; but, on the other hand, a flight of three "Wapitis" might get severely mauled if attacked by a squadron of nine fighters. This seems to have happened, and Nos. 32 ("Bulldogs") and 25 ("Furies") F.S. got at the Scots—but as there are no casualty reports this year, we cannot tell if Flodden was repeated.

Wednesday Night.—At last the night fliers got a practically perfect night. Only two aerodromes were reported unfit for use, and that only for a time. From dusk till dawn the night bombers came in one by one in a continuous stream, 49 raids in all. The searchlights may well have been nonplussed by the sheer numbers of the raiders. Without the help of searchlights, the fighters are helpless, except, of course, when the bombers show their navigation lights, and then attacks were not allowed within three miles of the target. The "Bulldogs" put up strenuous opposition, but 35 attacks were completely successful. It was, in fact, a great night for the "Virginias," "Hinaidis," and "Hyderabad." Let us not grudge it to them, even though the conditions were largely artificial. *"C'est magnifique, mais ce n'est pas la guerre."*

After the raiding on the Thursday morning, the Commander-in-Chief brought the operations to a close. The varied weather had provided valuable experience to both the Area Commanders and to the units. Apart from weather reasons, only one machine was forced to land. The navigation of the bomber squadrons in finding their objectives was in general good. Previous experience indicates that the number of interceptions was greater than could be anticipated in war. The low height of some raids made interception easier, and in war some of the raids would not have been pushed home in such bad weather. The majority of the routes of the bombers were planned to give plenty of practice to the Observers' Corps, and so the information given to the Northland Commander was better than he could hope for in war. The composite reconnaissance squadron gave 10 accurate reports of the movements of raiders. This may suggest possibilities for the future. The Observers' Corps made very good use of the opportunities afforded them. Their reports were found to tally in a very accurate manner with the actual tracks of the bombers. The Auxiliary squadrons and the Special Reserve personnel of the Cadre squadrons once again proved themselves worthy to take their place alongside the regular units in good weather and bad.



THE ROYAL AIR FORCE

London Gazette, July 18, 1933

General Duties Branch

The follg. Pilot Officers are promoted to rank of Flying Officer:—D. G. Keddie (March 5); W. E. Cameron (March 11); L. F. J. Taylor (April 11); R. E. Barnett, E. A. Collyns, N. G. Goodman, H. P. Jenkins, D. V. Johnson, R. Monks, T. A. B. Parselle, W. P. Sutcliffe, J. Worrall (June 19); R. C. M. Collard (June 28).

P/O. C. J. Giles is promoted to rank of Flying Officer with effect from June 19 and with seny. of Dec. 18, 1932; F/O. N. Stratton takes rank and precedence as if his appointment as Flying Officer bore date Dec. 28, 1931 (reduction takes effect from June 29); Group Capt. W. H. Primrose, D.F.C., is placed on retired list (July 3); Fl.-Lt. C. D. Pyne is placed on retired list (July 14).

The follg. Flight Lieutenants are transferred to Reserve, Class A (July 15):—F. G. Jennings, M. J. du Cray.

F/O. N. Stratton resigns his short service commn. (July 19); Fl.-Lt. L. M. Woolveridge relinquishes his short service commn. on account of ill-health (July 19).

Medical Branch

331193 Warrant Officer L. Jones is granted a permanent commn. as Quartermaster and Flying Officer (July 12); F/O. J. F. Ziegler, M.B., B.S., is promoted to rank of Flight Lieut. (July 5).

MEMORANDUM

175608 Flight Cadet C. H. Lucas is granted an hon. commn. as Sec. Lt., with effect from date of demobilisation.

ROYAL AIR FORCE RESERVE RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. Pilot Officers on probation are confirmed in rank:—N. Richardson (Lt., R.N.R.) (May 10); P. H. Meadway, W. H. Craven (May 16); J. D. Tucker (June 6); J. P. Sloan (June 14); R. S. Jukes (June 20); B. K. Burnett, N. V. Lindemere (June 27).

F/O. E. N. Fenton is transferred from Class C to Class A (May 26); F/O. C. S. Emery is transferred from Class A to Class C (June 10).

AUXILIARY AIR FORCE

General Duties Branch

No. 603 (CITY OF EDINBURGH) (BOMBER) SQUADRON.—The follg. are granted commissions as Pilot Officers:—G. L. Denholm (June 27); A. J. Deas (July 3).

No. 605 (COUNTY OF WARWICK) (BOMBER) SQUADRON.—A. G. Dennison is granted a commission as Pilot Officer (June 29). The follg. Pilot Officers are promoted to rank of Flying Officer (July 11):—W. M. Churchill, G. F. M. Wright.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: R. H. Kershaw, to No. 210 (F.B.) Sqdn., Pembroke Dock, 11.7.33, to command, vice G./Capt. A. T. Harris, O.B.E., A.F.C. H. P. Lale, D.S.O., D.F.C., to Air Ministry, Dept. of A.M.P. (D.P.S.), 10.7.33, for Personnel Staff Duties vice Wing-Com. A. H. S. Steele-Perkins, O.B.E. L. F. Forbes, M.C., to Station H.Q., Netheravon, 10.7.33, to command, vice Wing-Com. H. P. Lale, D.S.O., D.F.C. R. Halley, D.F.C., A.F.C., to No. 500 (County of Kent) (B.) Sqdn., Manston, 10.7.33, to command, vice Wing-Com. L. F. Forbes, M.C.

Flight Lieutenants: G. C. O'Donnell, D.F.C., to No. 24 (Commn.) Sqdn., Hendon, 10.7.33. G. V. Carey, to No. 100 (B.) Sqdn., Donibristle, 10.7.33. J. G. Hawtrey, to No. 601 (County of London) (B.) Sqdn., Hendon, 8.7.33. J. R. Jones, to H.Q., Wessex Bombing Area, Andover, 7.7.33. S. M. Park, to No. 99 (B.) Sqdn., Upper Heyford, 10.7.33.

Flying Officer: F. L. White, to R.A.F. Training Base, Leuchars, 10.6.33.

Stores Branch

Flight Lieutenant: E. A. Slater, to Central Flying School, Wittering, 11.7.33

Dental Branch

Flight Lieutenant: F. F. Kennedy, to R.A.F. Depot, Uxbridge, 12.7.33. **Flying Officers:** H. Keggins, to H.Q., R.A.F., Cranwell, 10.7.33. R. H. Marthews, to No. 1 School of Tech. Training (Apprentices), Halton, 12.7.33.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—**Lieut.-Com. (Sqdn.-Ldr., R.A.F.).**—C. B. Tidd, to *Glorious*, for 823 Sqdn., in command (August 1).

PROMOTION

Lieut.—E. O. F. Price (Flt.-Lt., R.A.F.), to rank of Lieut.-Com. (seny. July 15).

R.A.F. Stores Officers

The Air Ministry announces that about five vacancies for permanent commissions in the Stores Branch of the Royal Air Force will be offered for competition among young men who have attained the age of 23 and have not attained the age of 25 on January 1 next following the entrance examination (see paragraph 2). No extension of these age limits can be allowed in any circumstances. Candidates must have obtained the school certificate or an equivalent or higher certificate of education and have had not less than five years' business experience in one or more companies or firms of standing.

From among those who apply a limited number of candidates will be selected to proceed to the examination, which will be held in London in the latter part of October, 1933, and will consist of two parts, an interview before a board and a written examination.

Accepted candidates will be gazetted to commissions as pilot officers on

probation and will receive six months' training in their future duties. After a year's satisfactory service they will be eligible for confirmation in their appointments and for promotion to the rank of flying officer. Promotion above the rank of flying officer will be by selection, subject to passing a qualifying examination.

The emoluments of officers in the Stores Branch, including the value of quarters, rations and services in kind, or cash allowances in lieu, range at present from approximately £330 a year for an unmarried pilot officer and £360 a year for a flying officer on promotion to £1,120 a year for a married group captain (the highest rank for which provision is made). The expenses in Royal Air Force messes are strictly regulated so that officers, even of the most junior rank, can live upon their pay.

Applications should be made to the Secretary, Air Ministry (S.7), Kingsway, London, W.C.2, for the regulations and for application forms. Completed application forms should reach the Air Ministry by August 15 next, or at the latest by September 1.

BRIEFLY

THE Advertising and Marketing Exhibition which closed at Olympia last Saturday, July 22, was a triumph of originality. All the leading advertising agents were represented as well as the daily papers and periodical publishers. The design of the stands, a variety of competitions and many other interesting features drew a large crowd each day, who went away with increased knowledge, not only of how newspapers are made, but also of how every form of goods may be advantageously advertised.

That the hitch in getting away from Iceland experienced by the Italian "Armada" was not due to the fuel used is indicated in the following cablegram received by the Anglo-American Oil Co., Ltd.:—

"We have experienced no trouble of any kind with the fuel used in our flight and statements published to that effect are completely incorrect. Our forty-eight engines did not miss a single explosion throughout these flights, which is proof that engines as well as fuel have justified themselves. Quality and service rendered by the Oil Company were of the highest.—(Sgd.) BALBO."

Broadcasting at the Cinque Ports Rally at Lympne was by Fullagar Sound System. The office of the company is 18, Goring Road, Worthing. The loud speakers were very clear.

Owing to an official error Capt. Hope's "Swift" G-ABWH was, last week, reported as having been sold abroad. The real machine was a "Moth" ("Gipsy I"), sold by the Brooklands School of Flying.

Quite an interesting film on learning to fly is being shown this week at the News Theatre, Shaftesbury Avenue. It depicts Mr. Fulford giving lessons to a young and pretty lady pupil, and the photography is good, although the film is too short to be really instructive.

Col. W. A. Bristow, a well-known member of the Royal Aero Club and Chairman of Low Temperature Carbonisation, Ltd., suggests that it should be necessary to have a licence to burn raw coal: "We have to pay seven shillings and sixpence to keep a dog—the friend of man," he says, "Why not half a crown or five shillings for the privilege of discharging into the atmosphere soot and smoke—the enemy of man?"

Col. Strange's win of the Sherburn Short Handicap in the Spartan "Clipper" recalls the fact that Spartan aircraft have always done well in Yorkshire. In 1930 Mr. Wilson was third, in 1931 Flt. Lt. Stainforth first and the late Flt. Lt. Gibbons third, and in 1932 Col. Strange was second, all in the Yorkshire Trophy Race.

AIRCRAFT COMPANIES' STOCKS AND SHARES

Although at the time of writing recent tendencies in the industrial section of the Stock Exchange have been somewhat reversed and profit-taking more in evidence, shares of companies operating in the aircraft and allied industries maintained their recent gains quite well. Imperial Airways are 28s. 6d., compared with 28s. a month ago, aided by the anticipations current of a moderate increase in the dividend. Fairey Aviation are also higher on balance at 23s. 9d., compared with 22s. 6d., and de Havilland 23s. 9d., compared with 21s. 6d. Although the reports of the two last-named companies do not fall to be issued for several months yet, dividends prospects are already being discussed. Current market anticipations are that the results of both companies are likely to compare favourably with those for the previous year and that in the case of Fairey Aviation there are grounds for anticipating a larger dividend, having regard to the large margin of profits over the dividend on the last occasion and the saving now effected by the redemption of the debentures. Rolls-Royce were well maintained and more active, but D. Napier issues came in for less attention, and on balance for the month both preference issues also lost a few pence. Petters ordinary and preference are the same as a month ago, but quotations in this case have not been tested by much business; the results for the past year did not come as a surprise, for, as mentioned in these notes on the last occasion, the market was prepared for the further postponement of the preference dividend. Handley Page have been firm and are higher on the month at 9s., having remained under the influence of the past year's results and the statements at the meeting. Vickers improved a few pence to 7s., and there was a good rise in the 5 per cent. tax-free preference from 18s. 6d. to 21s. Shares of accessory companies were prominent, particularly S. Smith (M.A.)

Name	Class	Nominal Amount of Share	Last Annual Dividend	Current Week's Quotation
Anglo-American Oil	Deb.	Stk.	5½	102½
Armstrong-Siddeley Develop.	Cum. Pref.	£1	6½	20/-
Birmingham Aluminium Castg.	Ord.	£1	5	27/-
Booth (James), 1915	Ord.	£1	15	63/7½
Do. do.	Cum. Pref.	£1	7	27/6
British Aluminium	Ord.	£1	5	30/6
Do. do.	Cum. Pref.	£1	6	23/1½
British Celanese	Ord.	10/-	Nil	15/-
British Oxygen	Ord.	£1c	6½	34/-
Do. do.	Cum. Pref.	£1c	6½	26/3
British Piston Ring	Ord.	£1	12½	40/-
British Thomson-Houston	Cum. Pref.	£1	7	26/3
Brown Brothers	Ord.	£1	10	41/3
Do. do.	Cum. Pref.	£1	7½	28/9
Dick (W. B.)	Cum. Pref.	£10	5	117/6
De Havilland Aircraft	Ord.	£1	2½	23/9
Dunlop Rubber	Ord.	c	4	33/-
Do. do.	"C" Cum. Pref.	16/-	10	25/3
En-Tout-Cas (Syston)	Def. Ord.	1/-	Nil	7/6
Do. do.	Ptg. Pfd. Ord.	5/-	Nil	2/7½
Fairey Aviation	Ord.	10/-	10*	23/9
Firth (T.) & John Brown	Cum. Pref.	£1	6D	5/6
Do. do.	Cum. Pref.	£1	5*D	5/6
Ford Motor (England)	Ord.	£1	Nil	24/-
Fox (Samuel)	Mt. Deb.	Stk.	5	82½
Goodyear Tyre and Rubber	Deb.	Stk.	6½	104
Handley Page	Ptg. Pref.	8/-	10	9/-
Hawker Aircraft	Ord.	5/-	B	12/-
Do. do.	Red. Cum. Pref.	£1	B	18/6
Hoffmann Manufacturing	Ord.	£1	5	20/6
Do. do.	Cum. Pref.	£1	7½	23/9
Imperial Airways	Ord.	£1	3	28/6
Kayser, Ellison	Ord.	£5	Nil	50/-
Do. do.	Cum. Pref.	£5	6	67/6
Lucas (Joseph)	Ord.	£1	20	90/-
Napier (D.) & Son	Ord.	5/-	Nil	5/6
Do. do.	Cum. Pref.	£1	7½	22/-
Do. do.	Pref.	£1	8½	15/7½
Petters	Ord.	£1	Nil	7/6
Do. do.	Cum. Pref.	£1	7½G	12/6
Roe (A. V.) (Cont. by Armstrong-Siddeley Devel., q.v.)	Ord.	£1	—	—
Rolls-Royce	Ord.	c	10	52/6
Smith (S.) & Sons (M.A.)	Def. Ord.	1/-	Nil	4/6
Do. do.	Pt. Pfd. Ord.	£1	7	43/9
Do. do.	Cum. Pref.	£1	7½	24/4½
Serck Radiators	Ord.	£1	12½	40/6
"Shell" Transport and Trading	Ord.	£1	7½*	50/7½
Do. do.	Cum. Pref.	£10	5	£11½
Triplex Safety Glass	Ord.	10/-	10E	54/-
Vickers	Ord.	6/8	4	7/-
Do. do.	Cum. Pref.	£1	5*	21/-
Vickers Aviation (Cont. by Vickers, q.v.)	—	—	—	—
Westland Aircraft (Branch of Petters, q.v.)	—	—	—	—

* Dividend paid, tax free. c £1 unit of stock. D Last xd. March, 1931.
 A Last xd. September, 1931. B Issued this year. E On shares of £1 denomination. F 10/- paid. G Last xd. July, 1932.

preferred ordinary, which are 43s. 9d., compared with 37s. 6d. a month ago, there having been a wider recognition of the valuable participating dividend rights carried by these shares. Joseph Lucas remained firm on the possibility of a larger dividend, as did Brown Brothers, which are 41s. 3d., compared with 38s. 3d. a month ago. For some years the latter company has put a large proportion of its profits back into the business, and the time may be approaching when shareholders stand to participate to a larger extent in its success. Hawker Aircraft ordinary, which are of 5s. nominal value, have had a good rise during the month, being 12s., against 10s. 9d., and the preference have been a firmer market since they became fully paid. Serck Radiator were bought at Birmingham, where they had a good rise to 40s. 6d. and at the same centre British Piston Ring also moved in favour of holders. Interest in Triplex Safety Glass was well maintained, as the dividend is expected to be announced towards the end of next month.

PUBLICATIONS RECEIVED

Economic Conditions in the Netherland East Indies, February, 1933. Report by H. A. N. Bluett, O.B.E. Department of Overseas Trade: No. 550. London H.M. Stationery Office, W.C.2. Price 4s. 6d. net.

Aeronautical Research Committee Reports and Memoranda: No. 1502. *Aircraft Turning Performance*: Part I. By S. B. Gates. August, 1932. Price 6d. net. No. 1508. *Critical Reversal Speed for an Elastic Wing*. By A. G. Pugsley and G. R. Brooke. October, 1932. Price 9d. net. No. 1517. *Lubrication in Oxidising Conditions*. By R. O. King and C. Jakeman. Price 1s. net. No. 1524. Abstract: *The Oxidation of Fuel Vapours in Air*. By E. Mardles. March, 1933. Price 2d. net. London: H.M. Stationery Office, W.C.2.

U.S. National Advisory Committee for Aeronautics Reports: No. 452. *General Potential Theory of Arbitrary Wing Sections*. By T. Theodoresen and I. E. Garrick. Price 10 cents. No. 454. *Photomicrographic Studies of Fuel Sprays*. By W. Lee and R. C. Spencer. Price 10 cents. No. 455. *Penetration and Duration of Fuel Sprays from a Pump Injection System*. By A. M. Rothrock and E. T. Marsh. Price 5 cents. Superintendent of Documents, Washington, D.C., U.S.A.

Technical Notes of the U.S. National Advisory Committee for Aeronautics. No. 458. *Wind-Tunnel Research Comparing Lateral Control Devices, Particularly at High Angles of Attack*: XI. *Various Floating Tip Ailerons on Both Rectangular and Tapered Wings*. By F. E. Weick and T. A. Harris. May, 1933. No. 459. *Wind-Tunnel Tests on Model Wing with Fowler Flap and Specially Developed Leading-Edge Slot*. By F. E. Weick and R. C. Platt. May, 1933. No. 460. *Full-Scale Wind-Tunnel Research on Tail Buffeting and Wing-Fuselage Interference of a Low-Wing Monoplane*. By M. J. Hood and J. A. White. May, 1933. No. 461. *The Effect of Rivet Heads on the Characteristics of a 6 by 36 ft Clark Y Metal Airfoil*. By C. H. Dearborn. May, 1933. No. 462. *Formulas for the Stress Analysis of Circular Rings in a Monocoque Fuselage*. By R. A. Miller and K. D. Wood. June, 1933. No. 463. *Aerodynamic Tests of a Low Aspect Ratio Tapered Wing with Various Flaps, for Use on Tailless Airplanes*. By F. E. Weick and R. Sanders. June, 1933. National Advisory Committee for Aeronautics, Navy Building Washington, D.C., U.S.A.

Memorandum on the Economic Situation in Lithuania during the year 1932 and the Early Part of 1933. No. C.4156. Department of Overseas Trade. 35, Old Queen Street, London, S.W.1.

NEW COMPANIES REGISTERED

INCA AVIATION CO. (OVERSEAS), LTD.—Capital £8,000 in £5,000 8 per cent. participating preference shares of £1 and 60,000 ordinary shares of 1s. each. Aerial and land surveyors, cartographers, hydrographers, photographers, carriers of passengers and goods by air, sea and land, owners, repairers, builders and manufacturers of aircraft, etc. Permanent director: Martin K. de Trairup, 19, Grosvenor Place, S.W.1, contractor.

MORRIS INDUSTRIES EXPORTS, LTD.—Capital £250,000 in £1 shares. Objects: To carry on the business of exporters of motors, motor cars and vehicles of all kinds, vessels of all descriptions, airships and flying machines, and component parts thereof, and sundries or accessories thereto, etc. Sir William R. Morris is permanent governing director. S. G. K. Smallbone signs documents as managing director. Solicitors: Andrew Walsh & Son, 7, King Edward Street, Oxford.

Increase of Capital

AERO MOTOR SPIRIT CO., LTD. (Ripple Road, Dagenham).—The nominal capital has been increased by the addition of £1,000 in £1 ordinary shares beyond the registered capital of £2,000.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1931

Published July 27, 1933

30,039. ECLIPSE AVIATION CORPORATION. Engine-starting mechanism. (394,673.)

APPLIED FOR IN 1932

Published July 27, 1933

1,579. W. HELMORE. Testing combustible fluids. (394,736.)
 9,633. F. B. HALFORD. Valve gear for i.c. engines. (394,777.)
 14,740. FAIREY AVIATION CO., LTD., A. G. FORSYTH and M. C. MACPHERSON. Adjustable-pitch airscrews. (394,799.)
 19,996. A. F. C. POLLARD and SKY PUBLICITY, LTD. Optical projection apparatus. (394,818.)

Personal

PREPAID

(18 words or less 3/6, then 2d. per word).

To be Married.

DREW: HIME.—A marriage has been arranged between **FREDERICK ROBERT DREW, R.A.F.**, eldest son of Air Commodore B. C. H. Drew, C.M.G., C.B.E., and Mrs. Drew, of Brentwood, Harpenden, and **ELIZABETH HELEN ROSS (BETTY)**, elder daughter of Mr. and Mrs. F. R. Hime, of Inver House, Bembridge, Isle of Wight.

EARLE: RICE.—The engagement is announced between **MR. ALFRED EARLE, R.A.F.**, eldest son of Mr. and Mrs. H. H. Earle, of Shebbear, Devon, and **PHYLLIS**, only daughter of Mr. and Mrs. W. J. Rice, of Hempstead Road, Watford.

Married.

BROOK: GRETTON.—On July 19, 1933, at St. Margaret's, Westminster, **CAPTAIN E. W. BROOK**, of Kimmount, Annan, to **MISS MARY C. H. GRETTON**, younger daughter of Col. John Gretton, M.P., and the Hon. Mrs. Gretton, of 35, Belgrave Square, S.W.

LAST: GATTIE.—On July 12, 1933, at Croydon, **GEORGE CECIL HARRISON LAST**, of British Air Transport, Ltd., Croydon Aerodrome, son of Dr. C. E. Last, of Littlehampton, to **MARGARET LILIAN BURTON GATTIE** (formerly Leach), elder daughter of Frank Burton Leach, Esq., I.C.S., and of the late Mrs. Vernon Gattie.

Births.

BURNS.—On July 14, 1933, to **FLIGHT-LIEUTENANT** and Mrs. E. S. Burns (Kathleen Shepherd), 56, Cornwall Gardens, S.W.7—a daughter.

VENN.—On July 19, 1933, to **BETTY (née Stopher)**, wife of **SQUADRON-LEADER G. O. VENN, R.A.F.**—a daughter.

WINGFIELD.—On July 20, 1933, at 46, St. Georges Road, S.W.1, to **ELLA**, wife of **LAURENCE A. WINGFIELD**—a daughter.

MISCELLANEOUS ADVERTISEMENTS.

Advertisements for this column should arrive at this office by **Monday, 12 o'clock noon.**

Special PREPAID Rates:—

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PATENTS

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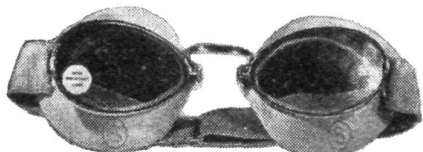
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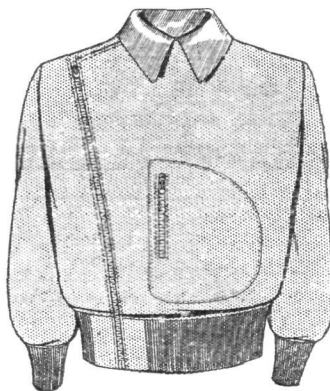
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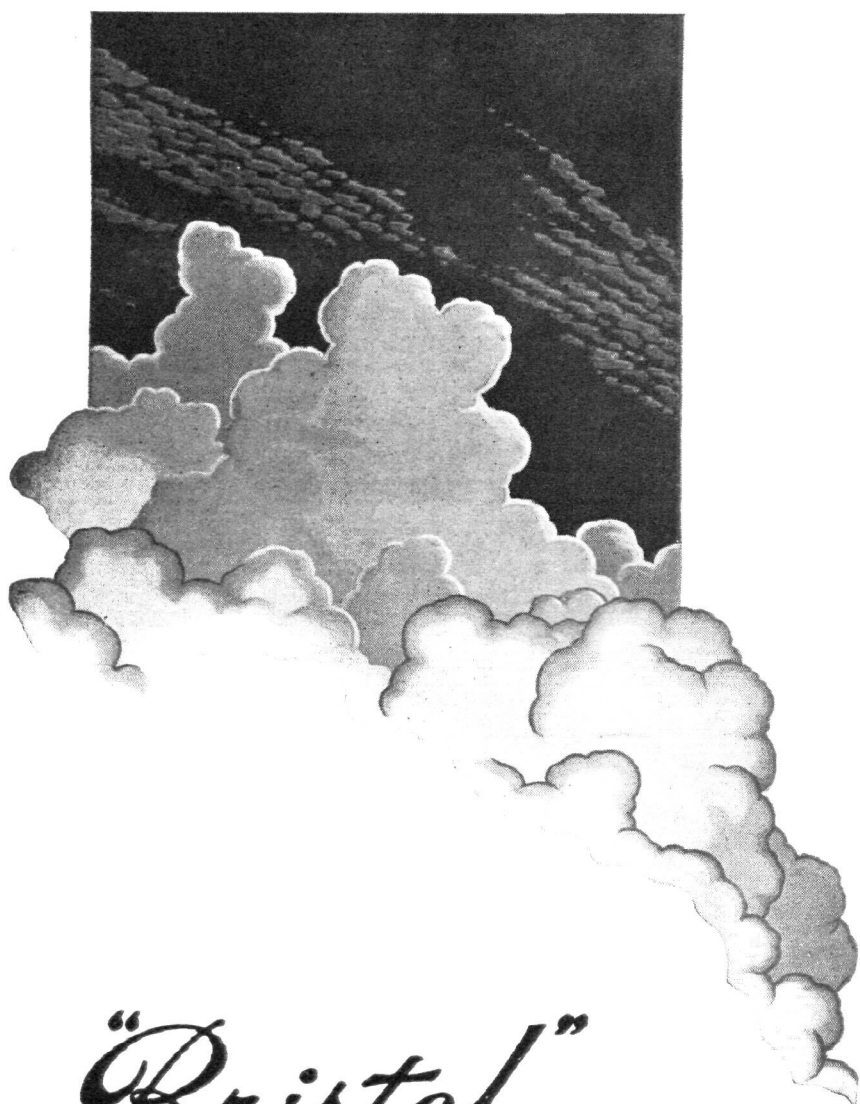
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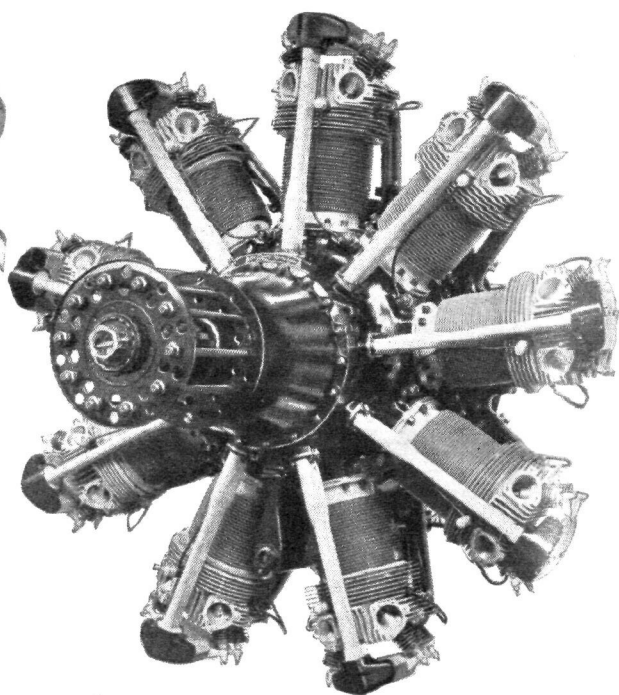
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